

Railway Maintenance Engineer

Vol. 16

March 1920

Number 3

(With which is incorporated the Engineering and Maintenance of Way Edition of the *Railway Age Gazette* and *Railway Engineering and Maintenance of Way*.)

Published on the last Thursday preceding the date of issue by the
SIMMONS-BOARDMAN PUBLISHING CO.,
TRANSPORTATION BUILDING, CHICAGO, ILL.

NEW YORK: WOOLWORTH BLDG. CLEVELAND: CITIZENS' BLDG.
WASHINGTON: HOME LIFE BLDG. CINCINNATI: 1ST NATIONAL BANK BLDG.
LONDON: 34 VICTORIA ST., WESTMINSTER, S. W. 1.
CABLE ADDRESS—URASIGMEC.

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ELMER T. HOWSON, Editor.
WALTER S. LACHER, Managing Editor. MILBURN MOORE, Associate Editor.
JOHN G. LITTLE, Associate Editor. H. F. LANE (Washington, D. C.)
ROBERT E. THAYER (London, Eng.)

Entered at the Post Office at Chicago, Ill., as mail matter of the second class.
Subscription price, \$2.00; foreign countries, \$2.50.

WE GUARANTEE, that of this issue 8,200 copies were printed; that of these 8,200 copies, 7,491 were mailed to regular paid subscribers, 58 were mailed to advertisers, 26 were mailed to employees and correspondents, and 625 were provided for new subscriptions, samples, copies lost in the mail and office use; that the total copies printed this year to date were 23,700, an average of 7,900 copies a month.

The *Railway Maintenance Engineer* is a member of the Associated Business Papers (A. B. P.) and of the Audit Bureau of Circulations (A. B. C.).

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With the changing ratio of population to natural resources, the American people are gradually being forced to adopt more frugal habits. This fact is particularly true with respect to our forests. There was a time when the railroads spurned almost anything but white oak for their crossties, but gradually they have been forced to accept inferior species of wood and, by the same token, have been compelled to adopt methods that insure a service in some measure commensurate with that obtained with the better material. The war and the subsequent period of readjustment have accelerated the process of depletion to such an extent that most of the better species of wood now have such a high value for other purposes than the production of ties, that their use for the latter purpose has become almost prohibitive. The owners of the wood lots can now get better prices for their oaks and other hardwood as flooring, furniture, etc. Consequently, the roads must resort to the softer and less durable woods to a greater extent than ever before. To the same measure, they must extend the use of preservative processes

One of the marked tendencies characterizing the return of the roads to private control is the widespread interest which is being evidenced in the preservation of ties and timber. This is in part a result of the growing realization of the economy, if not the actual necessity, for the conservation of our timber supply. It is more directly the result of the support given to this work by the Forest Products

Section of the Railroad Administration during the two years of federal control, for the government exerted every effort during this period to secure the maximum output of treated ties from the commercial and railroad-owned plants of the country and they were inserted in the tracks of a number of roads for the first time. As evidence of the activity at this time one commercial timber treating plant is now approaching completion on the South Atlantic seaboard, while a contract has just been let for the construction of another commercial plant in the Southwest. One railroad in the Middle West is contemplating the erection of three plants at various points on its system. An eastern road is negotiating for the building of two plants on its lines and a southern road is arranging for the erection of a plant to provide its requirements. While it is to be expected that the number of treating plants built will increase in view of the fact that less than one-third of the ties normally used by the roads of this country are now treated, the fact that such a relatively large number of plants are to be built at one time is unusual.

That an association of maintenance officers like the American Railway Bridge and Building Association should be able to spend twenty-nine years in the deliberation of the various phases of the duties of its members, and not exhaust many of the subjects, may seem rather remarkable on superficial consideration. As a matter of fact, there is plenty of work for as many committees as can well be organized. One subject in the list of committee assignments

for this year's work is the Maintenance and Repair of Freight House Floors. This same matter may have been discussed at the very first meeting of this association, yet the exercise of a little thought will readily show that this subject may readily warrant reconsideration at frequent intervals. There are two very good reasons why railroad freight house floors today present a different problem of maintenance than they did thirty years ago. The floors are different; the service is different. There was a time when hard maple was the only answer for the heavy flooring problem, but we now have many other floors, including such as creosoted blocks, mastic, concrete and even steel plate runways. With four wheel trucks and facilities for loading them with much heavier lading than could be applied by hand and with power tractors in general use, the traffic which the modern freight house floor must stand is much more severe than in the days of old. The same condition prevails in the other maintenance associations. Instead of suffering embarrassment for want of something to do, the committees have difficulty in keeping up with the rapid development of new conditions and application of precedent-breaking ideas.

AVOID OVERTIME WORK

ONE OBJECTIONABLE outcome of the payment of a punitive rate for overtime which has been noted in the building trades is the effort exerted by workmen to make overtime work necessary. Thus in Chicago it is difficult to get enough men to work in the regular work-day time, but plenty of them will show up for any Saturday afternoon, Sunday or holiday work paid at time and one-half or double time rates. This general tendency towards the curtailment of production as a means of forcing overtime has become so serious in Chicago that the contractors' associations have planned a concerted movement to avoid all work outside of the regular hours, and owners and architects have been asked to co-operate in carrying out this plan.

On railroad maintenance work the occasion for overtime as a means of speeding up the work is probably not as common as in building work carried on by contract. What incentive there is, if we are to judge by practices of the past, would arise from the desire to grant a virtual increase in the rates by allowing the men to work one or two hours overtime each day. Aside from the obvious objection to any underhanded method of providing an indirect advance in wage rate or to the increased cost of any work that is done outside of the regular hours, there is a very definite objection to overtime work. It is an incontrovertible fact that any man, who has once worked for any given rate of pay per hour, will be dissatisfied with any lower rate. So, if men are afforded frequent opportunity to work under the punitive rate their regular pay will seem inordinately small and a feeling of unrest becomes unavoidable.

While recognizing the necessity for avoiding overtime both because of the increased cost of any work done outside of the regular hours and of the unfortunate psychological influence of paying the punitive overtime, it is but fair to recognize the obstacle which the short workday imposes. Enough experience was obtained with it last summer to learn that the eight-hour day was not an unmixed benefit to the men themselves, as evidenced by the extent to which they showed a preference for jobs with contractors and industries that permitted them to work a full 10 hours and therefore obtain 10 hours' pay. The question is also perplexing in the case of work of a character requiring long hours of service without arduous physical labor. However, under the circumstances, all evidences point to the wisdom of adhering strictly to the policy of the short workday until such time as the fallacy

of its inflexible application to all classes of work shall have been more fully recognized by the powers that be.

THE MAINTENANCE OF WAY LABOR ORGANIZATION ON TRIAL

THE EVENTS OF the past month which culminated in the issuance on February 9 of a call for a general strike of maintenance of way employees, followed by its withdrawal a few days later, have focused the attention of railway men and the public at large on this, the youngest of the large organizations of railway employees. The movement to organize the employees in this branch of railway service is not a new one, but it made relatively little progress while the roads were under private control except in a few localities. However, since the inauguration of government operation, with the direct and indirect aid of various governmental agencies which this brought about, it has grown rapidly. As a result, at the annual convention held last fall in Detroit approximately 2,000 delegates were in attendance, representing, it is said, between 300,000 and 400,000 members. One of the actions of this convention was to authorize the officers to call a strike if the negotiations with the Railroad Administration did not develop satisfactorily.

The unrest which underlies this movement in the maintenance of way department is not entirely of recent origin, nor has it been without certain causes which must be recognized. These men have been among the last to resort to organization to secure recognition. As a result they have repeatedly seen the managements give in to other and less deserving, but more thoroughly organized, employees. This was in spite of the fact that they had consistently remained the most loyal group of men in the service. They therefore feel that they have a real grievance which in all fairness should be corrected. This situation has not only reacted against the employees, but against the interest of the roads as well, for maintenance officers have generally realized that the wages paid in recent years were so low in comparison with those in other departments as in general to attract a class of labor that is not only inefficient but also fails to furnish requisite material from which to develop foremen.

We believe, as we have stated repeatedly in these columns, that the maintenance of way employees have much of merit in their contention that as a class they have not received full justice at the hands of the managements in the past. We believe that the policy of the managements in dealing with these employees has been shortsighted in some ways and has not tended to inspire loyalty, but rather to promote organizations conflicting with the interests of the managements. At the same time, we believe that the Maintenance of Way Brotherhood's action in calling a strike as it did was highly ill-advised. At the time this action was taken the termination of federal control was less than four weeks' distant, and the framing of the legislation under which the roads are to be returned to their owners was in the final stages, which legislation includes a provision for the settlement of controversies of this character in a peaceable and lawful manner.

The public can only interpret the action of the officers of the Brotherhood of Maintenance of Way Employees in calling a strike at the time they did as an effort to forestall the return of the roads until their demands had been met and to take into their own hands the settlement of the controversy. By taking this step in the face of knowledge that all reasonable haste was being made in drafting legislation which would provide a lawful means for the settlement of such controversies, this organization could not but expect that public sentiment

would be arrayed against it. The public is tired of being placed at the mercy of small groups of labor leaders who see fit to disregard the orderly processes of law for the settlement of differences with their employers.

We are not opposed to the organization of employees in the maintenance of way department or elsewhere, for it appears that such organizations are a necessary development of our modern industrial life; also we are inclined to the opinion that the maintenance of way employees have much of merit in their contention that they are not receiving adequate compensation in proportion to the wages paid other groups of railway employees. We are, however, strongly of the opinion that no group of men in railway service or elsewhere has a moral right to disregard methods established by law for the determination of the merits of their controversies and to take matters in their own hands. We believe that a continuance of arbitrary action of this character on the part of officers of labor organizations will do much to bring legislation prohibiting strikes such as has recently been passed in Kansas, just as the abuse of power by corporations a few years ago led to the curbing of their authority.

AS TO DEFERRED MAINTENANCE

THE REVIEW OF maintenance under the two years of government operation, which appeared in the January issue of the *Railway Maintenance Engineer*, presented some data on the deficiencies in maintenance as of January 1, 1920, the specific facts, however, being limited to rails and ties. To show the exact condition of maintenance of all the roads in the country or even of a single property, obviously would require such a mass of detailed figures as to make it impossible of presentation in the space available for a single article, but unfortunately this is not the only obstacle, since many phases of maintenance of way and structures are so intangible as to leave room for a considerable difference of opinion as to the exact condition.

Some further light on this subject is given elsewhere in this issue in the form of an abstract from those portions of the reports of the regional directors referring to this particular subject. While most of these reports are limited to rather general remarks they contain some specific statements. Nearly all of them refer to the shortage of ties and rails. One of them states: "Way and structures have been well maintained except that ties and rails have not been available to permit normal renewals on some of the important roads." In another region we find that "the supply of rails has been less favorable except on lines that had provided for their needs prior to the current year." Still another report says: "Due to the comparatively small amount of new steel rail rolled, it has not been possible to carry out the desired programs of renewals and replacements."

The most specific information is presented by the director of the Eastern region, who reports that the shortage of ties at the end of 1919 was 9,310,000, or more than one-half of the average number used annually during the test period. In the case of rails, the shortage at the end of the two years, counting the deficiency in rail laid and in stock, was 122,000 tons, or about 40 per cent of the average annual renewals during the test period.

Only one of these reports referred specifically to bridges and culverts and that as follows: "In bridges and culverts the quantity of work has been less of permanent character due to a modified program for additions and betterments, resulting in more repairs and renewals of structures in kind."

One tendency that is observed in a number of the reports is the emphasis placed on precautions taken to

avoid overmaintenance of the properties, as indicated by the following quotation: "It was necessary to regulate the maintenance of way work in such a manner that the obligation of the government under its contract with the railroads would not be exceeded," or by another, "Where roads had apparently over-expended in 1918 * * * every possible effort has been made to reduce expenditures during the latter part of the year to the actual necessities."

From statistics now available, from public statements, in fact, from every source of information now to be had, it is an established fact that the roads are suffering from a serious deficiency in maintenance, but the degree or the loss of value in actual dollars, can be ascertained only after extended investigations, if at all. Indeed, certain factors of deficiency in maintenance will probably never be determined.

ARE ANY LESSONS TO BE LEARNED FROM GOVERNMENT CONTROL?

THE LAST page has been turned on one of the strangest and most remarkable chapters in the story of American railroads. The record of the period of government control is a tribute to the energy and brains of American railway men who were able quickly to adapt themselves to the new regime and "carry on" in spite of unfavorable circumstances. Government control obviously was not conducive to the most efficient management. It neutralized that esprit de corps which has produced such remarkable results on many roads, both large and small, under the leadership of such men as the late E. P. Ripley. On the other hand, it is but fair to state that in those phases of railway operation in which the central and regional organizations exerted the greatest degree of supervision the methods of certain of the roads were improved in some measure under the centralized guidance.

Consider the case of tie purchasers. Obviously, the methods instituted by the central organization of the United States Railroad Administration could not be superior to those prevailing on the best of the privately-managed roads, since the staff organized to conduct the work was composed of men selected from among the engineers, tie agents and timber treating officers of the individual roads. In fact, those roads which had been models in the selection, treatment and care of ties suffered no little retrogression in their methods and depreciation in results during the last two years because of the disturbance of their established practices. It is also a fact that extenuating circumstances, especially in 1918, led to some unfortunate consequences in the way of inferior ties. On the other hand, there is no denying that many roads obtained better ties under government control than for some time previous.

Centralized tie purchases are now a thing of the past. Even the standard tie specifications, it would seem, have gone by the board. What will be the result? The roads with properly organized personnel for the handling of ties will, no doubt, speedily restore their old methods. But how about the roads whose managements were less favorable? Will they profit by the lessons of the last two years? The chief difficulty in the past, it would seem, has been one of organization rather than personnel. There has been too great a gulf in some cases between the department responsible for the purchase of the ties and that concerned with their service life. In the absence of a definite relationship between these two agencies, the one responsible for purchases is too inclined to consider price rather than quality. Now that the prices of ties will be higher than ever before, the pressure of price will be so much greater and unless the railway officers responsible

thoroughly appreciate the meaning of quality, the specifications are likely to suffer. The net result of this is an increased burden on the track maintenance officer and if he does not wish to suffer the consequences he must be prepared to demonstrate the value of good ties, properly made and protected against decay until delivered.

THE END OF THE EXPERIMENT

BY THE TIME this issue reaches our readers, the railways of the United States will have been returned to their owners and the greatest experiment ever undertaken in the control and operation of a large transportation system by a government will have been brought to an end. We believe that as a whole, the experiment has been worth while. Inaugurated as a war measure to secure co-ordination of operation, it released the roads from certain handicaps to freedom of action so necessary to their most efficient use as an adjunct to our military operations.

Early in government control it became evident that plans were being laid by those in charge of the administration of this system, looking far beyond the termination of the war and that advantage was being taken of the opportunity to promote the interest of permanent government control. In other words, the war provided an opportunity for an elaborate trial of government operation under conditions more favorable to the success of this plan than would ever have existed under government ownership and it was possible to make this experiment without committing the country permanently to the policy, a condition which never could have been brought about in peace times. The past two years have revealed the advantages and the limitations of unified public control of the roads in such a way as to demonstrate conclusively the overshadowing magnitude of the latter as compared with the former. It has therefore stopped for many years, if not for all time, the agitation for government ownership of the roads.

In reviewing the effect of government control on railway operations one is early impressed with the fact that this development has probably exerted a smaller influence on the activities of the maintenance of way department than on any other branch of railway operation. Its organization was not seriously disturbed, as was that of the traffic department; its activities were not co-ordinated to any degree approaching that of the operating department; its standards were not affected as were those of the mechanical department, which had standard locomotives and cars thrust upon it.

In only two important respects did the effect of government control extend to the maintenance department, (1) in the concentration of the purchase of rails and ties in the administration's Division of Purchases, and (2) in the fixing of uniform wages and working conditions.

The future development of the policies of the roads with reference to these two influences will be watched with interest. The roads are already breaking away from the centralized purchase of rails and ties and are competing actively with one another for their requirements. It is likewise the expectation that the shortage of labor which the roads, in common with all large employers are facing, will lead to the breaking down of the uniform system of wages and working conditions and to the bidding of one road against another in actual wage rates, in hours of labor, in working conditions, or in other considerations. Such competition is to be regarded as unfortunate, for, while it probably cannot be avoided, its ultimate result is to increase the demoralization of labor and to reduce the amount of work secured. However, one cannot expect to secure the advantages of competitive operation without taking therewith the disadvantages.

LETTERS TO THE EDITOR

LENGTHEN SHORT TURNOUTS

Albany, N. Y.

TO THE EDITOR:

A large number of the yards and terminals in operation today are built to the same standards of crossovers, slip switches, etc., that were in use 20 or 30 years ago, except that in most cases heavier rail has since been laid. This practice has continued in apparent disregard of the fact that modern freight, passenger and switch engines, in addition to increased weight, have much longer engine wheel bases and their effect on these short leads is much more severe.

In freight yards with short leads and on No. 7 frogs, freight engines and even switch engines are being derailed continually and the switchpoints, lead rails and frogs are battered as fast as they can be maintained. This is also true of No. 6 and No. 7 slip switch crossings, for when large engines take the curves they generally make their own path and the track is thus forced out of line or the gage is widened. The result is an endless round of derailments and subsequent losses of time and money, all of which increases the cost of operation and adds to its maintenance costs.

This situation can be alleviated by using a frog of higher number in the ladder tracks, etc., even at the expense of cutting out one entire yard track and relining the remaining tracks accordingly. To relieve the strain at crossovers, short lengths of rail can be inserted without any change in the center-to-center measurement, though the length of the crossover from switchpoint to switchpoint will be necessarily increased. This has the effect of slightly straightening the crossover and allows a much easier movement of car trucks and engines. The same effect can be obtained to some extent on short slip switches and three-throw switches by widening the gage from $\frac{1}{2}$ in. to $\frac{3}{4}$ in., which is well within the maximum allowable amount, but it should be held there securely by the addition of strong rail braces and side plates.

Where the majority of derailments and wrecks in freight yards and terminals occur on double slip-switch crossings, the movable point type of frog should always be used in preference to the double-point type, as there is a less tendency toward derailment where the movable point is used. The advantage of this type lies in the fact that, as the movable point is always on the straight rail and against the knuckle rail for through movement, it thus presents an unbroken surface to the wheels. In addition, there is a three or four-inch leeway between the knuckle rail and the unthrown point, which eliminates the tendency of the wheels to ride the point. On the other hand, in the case of double-pointed frogs built on acute angles and with narrow flangeways, a loose wheel, a chipped flange or a defective truck will often cause a wheel to take the wrong angle or ride the point of the frog, resulting in either a derailment or damage to the frog or both. Double-pointed frogs can be used with fairly satisfactory results in passenger yards, where the coach trucks are inspected daily and kept in first-class condition.

CHARLES B. WILLIAMS.

A WOODEN RAILROAD—The United States has a railroad, 15 miles long, laid with wooden rails. It is in Alaska and extends from the head of navigation on the Tolovana river up to some gold mines. The single locomotive is an automobile with flanged wheels, and hauls three cars at a time.

LABOR SUPPLY STILL A CONTROLLING FACTOR

Season's Program of Maintenance and Construction Work
Depends on Favorable Statute and Ample Forces

WHILE THE amount of routine maintenance work which will be done this year is directly influenced by the trend of legislation under which the roads will be returned to their owners, the programs for the heavier projects involving charges to additions and betterments are almost entirely dependent on this action. Therefore all maintenance of way men are watching the trend of events in Congress closely.

However, in the event of reasonably favorable legislation, as now appears likely, there is another factor which will exert a retarding influence on the work for the year. This is the supply of labor and its efficiency. There is a general impression that the amount of maintenance and improvement work which can be done will be limited by the forces which can be recruited to handle it. To ascertain the exact condition in this respect on the roads in different parts of the country, we addressed a letter to a number of officers in direct charge of maintenance operations in widely separated localities, asking for information concerning the amount of work in prospect on the roads in their vicinity in the event of favorable legislation, the probable adequacy of the supply of labor and its character as compared with that of previous years, the effect of the more general organization of labor on the conduct of the work and other influences affecting the labor problem. The replies to this letter are abstracted below:

CONDITIONS IN CANADA

We are confronted with a somewhat similar condition to that experienced in 1919. The general situation is that in the East the labor market will be nearly normal as regards prices and supply, while in the West there will be a shortage and general tendency towards higher rates. In the West the available supply is principally foreigners, and there is now a movement likely to grow rapidly towards returning to their native lands. In the East there is and has been a good supply of native labor, which is very likely to continue throughout the coming year.

There is a certain amount of unrest amongst the regular railway laborers and dissatisfaction with the present rates, and as the industrial and civic employment bureaus are now offering 50 cents an hour for labor, it will have an effect upon the rates now paid the railway laborers. No advance on the present rate (40 cents an hour) is anticipated during the earlier months, but as the demand grows and competition grows stronger, we anticipate that 50 cents an hour will be the general rate both for permanent and temporary laborers in railway work.
—*Engineer on Canadian road.*

LABOR SCARCE IN NEW ENGLAND

The labor situation was very acute on the Boston & Albany during 1919. At no time were we able to secure all the forces which were authorized. This was particularly so in our floating gangs, which is a reversal of the old order of things. This necessitated the deferring of a considerable amount of necessary work, particularly in the line of ballasting. Not only did the shortage of labor affect the ballast program, but the great uncertainty of what we could get placed us in the position of not daring to attempt any extensive program of ballasting, lest the men should suddenly leave us with a lot of track in an open condition. We were able, however,

to accomplish the full installation of ties and the laying of all rail that was given us.

The quality of labor now following railroad track work is deplorably inefficient; in fact, only a very small percentage of them are track men at all or know anything about the work, and the turnover is so frequent that the foremen spend all their time teaching men, so that to produce really fine track is out of the question.

I have not found anything in the labor organization as concerned with the track department that is going to militate against the conduct of regular maintenance work. The trackman in the past has always been called a laborer and looked upon as a laborer, where as a matter of fact if he has had experience in track work he is really a most skilled mechanic and I believe he will have to be recognized as such if we are going to get our expert trackmen back. I am also satisfied that there would be considerable economy if we could again attract the old type trackman to the work. In order to do this, however, there will have to be a considerable increase in the present rate paid them. It will also be urgently necessary that all roads make large investments in labor-saving machines of all kinds, whether they do the work more economically than with manual power or not, for the reason that the manual power will not be available.

We have a very large amount of deferred work which is undoubtedly waiting upon definite legislation, so that we may know exactly where we stand before proposing to carry it out.—*F. B. Freeman, chief engineer, Boston & Albany.*

EFFICIENCY FLUCTUATES WITH SUPPLY

It is rather difficult for us to estimate at this time how much work will be undertaken by the railroads during the coming season, in view of the fact that the question of government operation of the roads has not been definitely settled, and the source of the necessary funds for improvements is not at all clear. Therefore, it is impossible to say how much work it is proposed to do next season.

The labor shortage on our line no doubt will be more serious next year than in the past, as the building and industrial operations in our communities are on the increase rather than the decline. The character of the labor that we have had in the last two seasons has been practically the same as in the past, as far as nationality is concerned, the majority of our men being Italians, but the efficiency of these men is measured directly by the adequacy of the supply. Last spring when there was a surplus of labor the efficiency of the men was increased markedly as compared with the previous season and with their efficiency after July 1, when a labor shortage again became apparent. The labor organizations have not as yet organized our laborers to any very marked extent, and consequently their effect has not been felt among our men.—*Engineer Maintenance of Way, eastern road.*

PROGRAM DEPENDENT ON LEGISLATION

The outlook for expenditures for additions and betterments is, of course, dependent to a large extent upon the character of legislation which is passed prior to the return of the railroads to corporate control. Unless such legislation restores the credit of the railroads and

furnishes incentive to private ownership and the ability to protect its earnings, there is little probability that even necessary capital expenditures will be undertaken. Those railroads which are fortunate enough to be able to continue to earn a surplus over operating expenses and fixed charges are not likely to undertake extensive addition and betterment work until the prospects of an adequate return are assured.

The supply of labor will, of course, depend largely on the activity of general industry. At present on railroads with most capital expenditures discontinued the supply of labor appears to be ample for maintenance work.

There is no doubt but that the character of service rendered at present as compared with that of several years ago is inferior, which is due both to a lack of incentive for excellence on the part of the employee and the lack of a means of compulsion on the part of the employer. This condition has, no doubt, been stimulated to a large extent by the increased extent to which the employees have become organized; but since it permeates practically all walks of life, the cause will be found to lie deeper than mere organization.—*Engineer on a southern road.*

NEGRO LABOR SPOILED BY HIGH WAGES

We depend almost entirely upon negro labor, and there probably is no class of labor more uncertain than the negro. I do not think there is any question but what the negro has been ruined for some time to come by the high wages and short hours which he has enjoyed during the past year or two. This not only applies to those working on the railroads in this territory, but has been further augmented by the transportation of the negro to the North and East to work on Government and other jobs at rates of pay such as he had never heretofore even dreamed of. Then, again, the soaring price of cotton has attracted the negro to the farms in great numbers during the past year or two, and the indications are there are more who will go to farming this year than heretofore.

At the present time we have a full working force, and, as far as I am able to learn, this is true of all roads in this territory. I suppose this will continue until about April 1 and then forces will begin to fall off. If there is no heavy drain on the labor from Tennessee, Mississippi and Louisiana for northern points, we will be about able to secure the labor necessary for regular maintenance work. There is a great deal of building work in progress—not connected with the railroads—and considerable highway work under way and more contemplated. However, this, as yet, has not affected our labor supply.

As regards the effect of labor organization upon labor: we are approaching the end of federal operation with our foremen and white labor fully organized. Some strenuous efforts have been made to organize the negroes, but I doubt if much progress has been made. However, it does not matter much, for in this country the negro, as a rule, will do as the white foreman orders. The effect of organization and short hours has unfortunately been to cause a reduction in efficiency of the younger element in the service and this element is in the majority. The older men are still functioning 100 per cent, but the shortened hours have reduced the output to such an extent that more men are required to get the same result.—*Engineer on a southern road.*

LABOR EFFICIENCY RESULT OF POOR SUPERVISION

The Texas & Pacific did not suffer seriously for labor in 1919. Practically the only serious shortage was on the Rio Grande division, and that largely between Baird and Big Spring, which was due to the heavy cot-

ton crop and the demand for pickers in that area. We also had a little shortage due to the same causes in the neighborhood of Paris, Honey Grove and Sherman.

Rather close contact with the labor element of this territory during the last year or two does not show that the quality of laborers has been seriously impaired. I have heard a great deal of talk to that effect, but it has been my experience that the deterioration has largely been in the foremen. There has been a serious falling off in the quality and general effectiveness of the section and extra gang foremen. The application of the recent wage agreements and the increased wages has not operated to make them better. It is my opinion that if there has been any falling off in the general quality of the labor, it is reflected from the laxity of supervision in the track foremen.

I find but little change in the quality of the laborers, particularly the Mexican laborers. The negro laborers seem to be a little more independent than they were before, and work fewer days in the week, for the reason that they get more money for it, but, generally speaking, our negro labor is very good, and we have no serious complaint to make of them.—*R. H. Gaines, engineer maintenance of way, Texas & Pacific.*

RESTRICTIONS ON MEXICAN IMMIGRATION REDUCE SUPPLY

We are contemplating nothing more than the normal maintenance program after March 1. Generally, it will require some time for the railroad companies to find out just what the situation will be after that date and I believe it is unlikely that there will be, in the meantime, a disposition to do more than is necessary.

This section of the country is quite dependent upon Mexican labor for track work. This class of labor is somewhat more plentiful now than it has been during the past two or three years, but the restrictions on immigration still work to limit the supply to a considerable extent.—*J. L. Campbell, chief engineer, El Paso & Southwestern.*

GENERAL INDUSTRIAL ACTIVITY WILL LEAD TO SHORTAGE IN WEST

It is thought that in the event of favorable legislation the railroads in the territory adjacent to the lines of the Chicago, Rock Island & Pacific will have a liberal maintenance and improvement program, but the extent of this program will be entirely dependent upon the type of such legislation. Due to various reasons, which need not be commented upon at this time, the improvement program of most railroads has been materially curtailed. For these reasons it is felt that, if given favorable legislation, the railroads will be liberal spenders of money.

To meet this situation the roads are confronted with what will no doubt be the greatest shortage of labor that they have ever experienced. The industrial situation is such that it has attracted a very large percentage of what we know as common labor on the railroads to such industries, largely due to the higher rates of wages paid, as well as the opportunities for increased compensation. The lack of immigration has, of course, prevented the obtaining of foreign labor to add to the supply, and, in fact, emigration of a large number of foreigners has further depleted the labor supply, and the conditions in Mexico are not such as to lead one to believe there will be any great influx of Mexicans into this country to improve the supply. For these reasons it is felt that, even though liberal appropriations are made, there is very little likelihood of our being able to spend the sums of money that are appropriated.

There is a large amount of improvement work in various cities in the southwestern territory, such as pav-

ing, new sewers, drainage propositions and other things of this nature. Large sums have been appropriated for new highway construction, a great deal of which, for reasons very apparent, is closely adjacent to the railroads. The labor required for these various classes of work will have to be drawn from the local supply and therefore there is little likelihood of the railroads being able to secure anything like a proper supply. Hence, to a considerable extent at least, regardless of the type of legislation, the authority for improvements will be curtailed because of the lack of a sufficient labor supply, and there is also no question of the fact but that the very high cost of carrying on such work at this time will have its effect upon those authorizing funds for it.—*H. G. Clark, assistant to federal manager, Chicago, Rock Island & Pacific.*

OUTLOOK FOR NATIVE LABOR GOOD IN NORTHWEST

While we are yet unable to say definitely what work of an extraordinary nature will be undertaken this year, it is expected that a normal amount of work will be done. The relaying program in tons of rail laid will correspond closely to the programs of recent years. The amount of ballasting to be carried on during the year will equal, if not exceed, the amount in the past three or four years. The renewal of ties probably will show a slight decrease. All items of work considered, there will be needed the average number of laborers.

The labor situation in general is not so promising as it was at this time a year ago, owing to a considerable number of foreigners who usually seek employment on the roads in the Northwest having left the country at the close of the past season. The situation as respects native labor does not show much change and we expect to obtain all the labor of this class we are likely to need in Wisconsin, Minnesota, eastern North Dakota, eastern South Dakota and Iowa, except in a few districts, and in these districts the situation will not differ materially from that of last year.

In the states of Washington, Idaho and Montana and the western portion of North Dakota, where very little native labor is to be had and for this reason foreigners are used almost exclusively, there probably will be a greater scarcity of laborers than in 1919. This situation can be met and probably will be met by the extension of the working season, commencing the work earlier and carrying it into late fall or early winter. It is our plan to get practically all the improvement work done by the opening of the crop-moving season. In some years we are unable for one reason or another to accomplish this end and the present year may be one of them.—*Engineer Maintenance of Way on a northwestern road.*

MUCH WORK IN PROSPECT IN CENTRAL STATES

The railroads in this vicinity, generally, have a large amount of deferred track work, such as rail laying and ballasting, and perhaps to some extent tie renewals, that, with favorable legislation, producing the necessary revenues, and with sufficient labor available, ought to be caught up this year. Most of the railroads, also, I think, have in contemplation a considerable amount of improvement work such as double tracking and grade reduction work, the construction of new and the extending of old sidings, the renewal of light bridges with heavy bridges, the erection of modern roundhouses and shop buildings in place of outgrown facilities of this kind and the construction of new yard facilities.

It is my present impression that there will be some shortage of labor, although just now I would not undertake to estimate the exact measure of such shortage. With respect to the character of labor available for rail-

road work compared to that of previous years, I have noted that there has been a gradual defection for several years in the ranks of men employed by the maintenance of way departments due to attractions in outside industrial fields, and the average value of the men available for employment in the maintenance of way department is something less than the old average of former years. Apart from this, there has gradually developed a different and what I might call a less loyal attitude among railroad employees, which, I presume, is naturally to be expected in consequence of their new allegiance to the various labor organizations which have come into being during the period of federal administration.—*Engineer on a central road.*

PROSPECT FOR SHORTAGE IN WEST

At the present time we are unable to forecast how much work aside from maintenance, including a reasonable program for rail and bridge renewals, the Oregon Short Line may count on during this year. The labor situation is by no means encouraging. In this territory highway construction and general building activity will without doubt demand much more labor than is now in the country. The labor is far less efficient than in previous years.—*W. R. Armstrong, assistant chief engineer, Oregon Short Line.*

SKILLED WORKMEN SHORT ON PACIFIC COAST

A great deal of work is opening up on the Pacific Coast which is creating a great demand for labor of all kinds. The railroads are fairly well supplied. In the track department we are depending almost entirely on Mexican labor. We find a rather restricted condition existing in connection with the more skilled labor, such as carpenters, plumbers, water service men and mechanics of that character, owing to the fact that the high wages in outside lines are being maintained.—*Engineer on the Pacific Coast.*

LONG SERVICE FROM DOUGLAS FIR CROSSTIES

A TEST of Douglas fir cross ties installed in the main line of the Great Western Railway of England has resulted, according to information furnished to the Forest Branch, Victoria, B. C., in but 23 ties out of the 616 which were originally laid being removed after 17½ years of service under heavy traffic.

The original group of ties of which service records were kept consisted of 616 high grade Douglas fir timbers sawn to size, their dimensions 10 in. wide, 5 in. deep and 9 ft. long. Being comparatively dry when received, they were only kept in stock for a period of nine weeks which was sufficient to finish the seasoning necessary before subjecting them to the preservative process. The method of preserving them consisted of impregnating the ties with a creosote oil, the total amount of absorption averaging about 0.8 gal. per cu. ft. of timber treated.

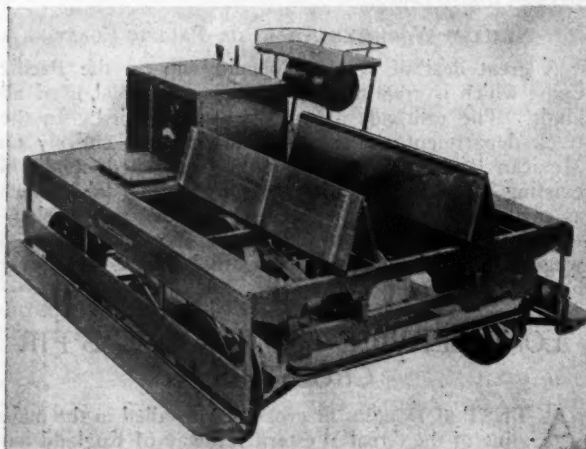
The ties were inserted on May 1, 1898, in the main line of the Great Western at a location where the maximum grade was 0.06 per cent descending on a four-degree curve. The subgrade at this point was an embankment composed of marl and gravel, while the ballast used was crushed rock. The usual British construction was followed, i. e., standard 45 ft. rails, of bullhead cross section and weighing 92 lb. per yard, supported by chairs. The first report made on these ties was on September 26, 1914, when they were all found to be still in a serviceable condition after having been in track for 16 yr. and 5 mo. In October, 1915, they were again inspected and this time 23 were removed on account of decay, which was found to be

the sole cause necessitating renewal. The remainder of the ties, with a life up to that date of $17\frac{1}{2}$ years, were in good condition and were left in service.

AN ELECTRICALLY DRIVEN TAMPER

ONE of the latest devices to enter the field of labor-saving equipment for maintenance of way work on railroads is an electrically-driven tie tamper which is now being brought out by the Kalamazoo Railway Supply Company, Kalamazoo, Mich. This device, known as the Jackson electric tie tamper, is a compact device weighing 45 lb. for the standard model and 35 lb. for the special aluminum model and consists of a special enclosed dust-and-waterproof electric motor to which is clamped a spring steel handle and a heavy tamping bar.

The motor is of the induction type, designed to operate on a 110-volt, 3-phase, 60-cycle circuit, and is of very heavy construction. This type was adopted in order to secure satisfactory service in the hands of unskilled laborers; the simplicity of an alternating current motor which does not require any commutator brushes, springs, etc., being considered a distinct advantage under the conditions under which the tamper will be used. The rotor,



Motor Generator Car with Deck Boards Raised

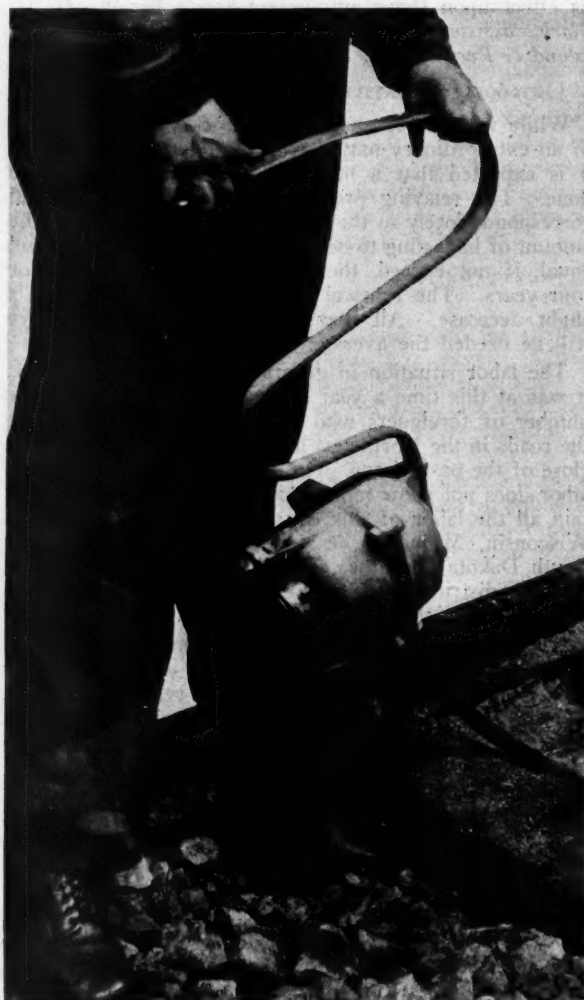
which forms the only moving part employed in the construction of the tamper, is mounted upon a large heavy steel shaft, supported on each end by a double row of self-aligning ball-bearings, and carrying a heavy unbalanced weight made of steel on the end of the shaft next to the tamping bar. The power consumed by this motor is approximately $\frac{1}{2}$ hp. while it is being operated.

The handle of the tamper is an S-shaped flat steel bar clamped to the end of the motor which tends to absorb any vibration that might be transmitted to the operator, yet is of sufficient strength to allow considerable weight to be applied to the tamper. The tamping bar itself is a comparatively short and heavily constructed iron bar, the end of which has been forged to the proper size found necessary for this class of work.

The principle employed in this device is to secure a series of rapid impacts which will tend to compact the ballast as well as to drive it under the tie. This action is secured in the new tamper through the use of the unbalanced weight on the rotor shaft which, as it revolves at about 3,600 revolutions a minute, sets up a powerful vibration on the end of the motor casing, which in turn communicates it to the tamping bar. It is claimed that the design of the mechanism is such that the impacts,

or kicks as they are called, are delivered in two directions, one in a line with the end of the bar forcing the ballast beneath the tie and the other in a downward and backward direction tending to compact the ballast supporting and surrounding the tie. The force of the blow may be regulated to suit any specific requirements by the use of a lighter or heavier unbalanced member.

The current is transmitted to the tamper through a flexible cable which may be carried on cable reels, allowing the tamper to be operated at a distance of several hundred feet from the source of power. This arrangement thus permits the use of various combinations



Using the Electric Tamper in Gravel Ballast

ranging from a small two-tool plant, consisting of a small gasoline engine with a self-excited generator mounted on wooden skids which may be transported on a push car, up to a 10 or 12-tool plant made integral with a motor car. The lighter outfits, consisting of two and four-tool combinations, may be lifted from the push car, etc., and placed beside the right-of-way by two, three or more men. The larger plants have the generator mounted under the deck of a motor car, the generator being belt driven and easily accessible through the removal of hinged sections in the deck of the car. The combination car shown in the illustration is capable of handling a trailer loaded with tools in addition to transporting from 25 to 30 men.

RYAN CHANGES HIS MIND

BY CHAS. H. SMITH

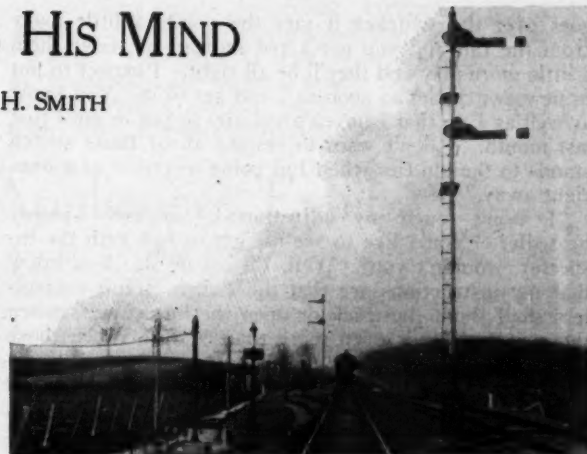
IF TIE RENEWALS had been furnished "Red" Ryan in February and March instead of in July and August he never would have had occasion to visit Henderson, division engineer on the Northern division of the C. W. N. & P. Again, if Red's temper had not matched his hair—which, as his name betrays, was of a fiery hue—there would not have been the incentive of quick impulse to "even up" things with Cassidy, the block signal maintainer, and in this case also the division engineer's office would not have seen Ryan. But perhaps fortunately for Ryan—and maybe others, too—he did visit Mr. Henderson's office, due principally, as has been noted, to the slowness of the tie delivery in combination with Foreman Ryan's quick temper.

Ties for renewal purposes had been very slow in arriving. In particular was this true of switch ties. Ryan needed renewals in every one of his switches, which is saying that he needed many, for his territory extended into the Bennet Avenue yards. Besides the several switches in the yards Ryan had two long passing tracks to maintain on the north end of his section—passing tracks which were much used—and these gave him four more switches. In addition to the switch ties he needed of course his annual allotment for the three miles of main line which he supervised. But in common with the rest of the foremen over the system it was late in the summer before he got them. Even then he only received about two-thirds of the number that were needed. Herein was the cause of the trouble with Cassidy.

On the third day of October the "Chicago Limited," the crack train of the C. W. N. & P., found a red block signal staring it in the face at the north end of Ryan's section, and was delayed 20 min. in flagging it through. The conductor had naturally put this delay in against a failure of the automatic block signals and a few short hours afterwards Cassidy, the maintainer, had received a rather blunt telegram asking "Why?" Plainly the signal department was putting it up to him.

Cassidy, however, had already ascertained the cause of the red indication long before he had received the message. When No. 2, as the "Limited" was known on the time card, had not shown up on time he had had his suspicions as to what was delaying them and putting his motor car on the rails had sped northward over his territory. When he had gone nearly half way to the north end he met No. 2 and as they swept past him the engineer threw off a hastily scribbled note which read: "Block signal No. 198 stands at red." Replacing his car on the rails Cassidy started for the signal. Before he had gone far he saw Signal No. 183 standing at red against north-bound trains. Two of them were out!

Immediately he began to consider the possible causes of the failure. A broken rail would set both signals at red, or broken bond wires, or an open switch. But Cassidy knew that his track was well bonded and, unless something had been dragging recently and had ripped out some of the wires, that the cause was elsewhere. As he went slowly towards No. 198 he watched for a broken rail, keeping an eye on his bond wires to see if any were "sticking up" at the same time. Almost always he could detect a broken rail by merely passing over it, whether he was looking for one or not. Cassidy had little hope of finding one, for he thought that he knew exactly where the trouble was located. As he passed each switch he



looked at it sharply and when he came to the north switch of the north passing track he stopped his car and got off. Signal No. 198 was a few rods ahead of him and No. 183 was the first one south. Stepping up to the switch point he inspected it closely. "I'll bet ten dollars," he said aloud as he began kicking the point vigorously, "that the trouble is right here." Almost immediately Signal No. 198 climbed from its horizontal position to a vertical one and he felt sure that No. 183 a mile and a half away had done likewise.

With a few forceful imprecations upon the head of Ryan, the maintainer set about to repair the defect, although the cause was in the track and not in the circuits which he maintained. Examining the switch he saw that the ties to which it was spiked were in bad condition. The spikes had worked loose, due to the vibration caused by the heavy traffic which passed over the switch and to the poor condition of the ties, and the stand had moved slightly toward the rail, allowing the switch point to gap just enough to operate the contacts in the switch circuit controller, shunting the track circuit and causing the automatic block signals to go to red. It was apparent that the switch stand needed respiking and new ties, as Cassidy had told Ryan three weeks before. Not having the necessary tools, Cassidy simply unscrewed the nuts on the bolts in the point, took off the clamp and inserted a nut lock between the clamp on the head rod and the switch point, which allowed him to draw the point close to the rail. It was, he realized, only a temporary repair and as soon as it was finished he started back to where he had passed Ryan and his men working.

When near the spot where Ryan and his gang were putting ties in the main line he applied his brake and the car slid up to Red, who was standing beside the track. Cassidy was a straight-from-the-shoulder sort of a man and he minced no words when he spoke.

"Ryan," he began incisively, "you remember that I spoke to you about those switch stands on the passing tracks at the north end three weeks ago. I told you that there'd be trouble if you didn't do something to fix them up. No. 2 just got about 20 min. on No. 198—out because that switch stand on the north end of the north passing track had worked loose and let the point open. There's going to be h—I raised about that when they hear what caused it. And it's not up to me, either."

Red grinned. He liked to hear Cassidy "go up in the air," as he expressed it. "Take it easy, Cassidy," he said. "Take it easy. The trouble is with your adjustments—you've got them too fine on those switches. Any little vibration will set the signals red and when a train

goes over the switches it jars the points a little away from the rail and you get a red indication. Give them a little more play and they'll be all right. I expect to put in new switch ties as soon as I can get to it. You know as well as I do that I haven't had any to put in until just last month. I don't want to respike all of those switch stands to the old ties when I'm going to put in new ones right away."

"I won't touch my adjustments," replied Cassidy heatedly. "You'd like to see me get in bad with the inspector, wouldn't you? Well, I'll not do it. You know that my instructions are that the switch circuit controllers shall shunt the track or open the line circuits when the switch point is open more than $\frac{1}{4}$ in. When those switch points work loose, as that one did today, trains are going to get a red indication of the signals. If you don't want to respike your switch stands that's up to you. Furthermore, I'll place the cause of the failure where it belongs."

As Cassidy finished this ultimatum he gave his car a push and was off. Ryan watched him perplexedly. Red and the maintainer had never become adjusted since the block signals were installed and they still had more or less friction between them. Usually this was manifested when they had some work which they had to do together. If Ryan wanted to take out a rail Cassidy could not always be on hand when Red wanted to do the work. Consequently the bonding of the new rail was sometimes left undone for a day or two, dependence being placed on tight joints for carrying the current. Or perhaps Cassidy insisted on having new insulation placed on certain joints immediately—when Ryan had another job that he wanted to get done first. Certain it was that they did not get along as well as they might have. So after Cassidy's outburst—more explosive than usual—Ryan was somewhat puzzled. Still he hardly thought that the maintainer would do anything to force him to respike his switch stands. In a few days—as soon as he could get a few more ties in the main line—he would attend to the switches. Turning from watching the rapidly disappearing maintainer Ryan gave his attention to the work at hand.

But the next day when Red received a pink envelope containing a telegram he changed his opinion. Tearing it open he unfolded the single sheet it contained. "The signal department," it read, "has advised Mr. Henderson that due to your failure to keep your switch stands properly spiked, the automatic block signals are set at red. They claim that this is caused by loose switch points. We are also advised that No. 2 was delayed 20 min. on October 3, because of a loose switch point on the north switch of the north passing track on your section. Please attend to this immediately without fail and advise when O. K." Signed A. C. Brittan, road-master.

As Ryan read this a second time a dull red crept over his face. For the first time in his career he had been reported. He was mad clean through. Cassidy had reported him and to report a fellow-employee was, in Red's opinion, an act which stamped the person doing the reporting as belonging to the race of reptiles. For a few seconds he could hardly believe his eyes, then crushing the message in his hand he doubled up his fist and brought it down with a resounding thud in the palm of his left hand.

"So he turned me in, eh?" he soliloquized. "We'll see about this thing right way. I'll show him!"

Now Red's method of "showing him" was not to pulverize Cassidy with his fist as his manner suggested—although he might do that later. The first consideration with Ryan, however, was to defend his reputation as a

foreman and in order to do this he instantly decided to present his side of the case directly to Henderson. As long as Cassidy had violated ethics by reporting him, Ryan's code permitted him to even up things by returning the rather dubious compliment.

Catching the first train in, Red immediately went to the general offices. As he walked down the hall of the big building he formulated in his mind how he would present his case. Clearly Cassidy was to blame—it was the adjustment on the switches in connecting them up with the block signals that was wrong, thought Ryan. And he really believed this. He'd vindicate himself and show Cassidy that two could do the reporting as well as one. When he came to the door with the words "Division Engineer" printed across its ground glass front he turned the knob and entered. Except for a stenographer no one was in the room.

"You wish to see Mr. Henderson?" inquired the girl.

"Yes—I'd like to see him," replied Ryan.

"He's busy just now, but he will be through soon if you wish to wait."

Ryan deposited himself upon a settee and inspected the room. It was the first time he had ever been in the division engineer's office and he was interested to see just what it looked like. All at once he became aware of the sound of voices and looking to his right he noticed that a door leading out of the room had opened slightly and the sound came from there. Without being conscious of eavesdropping, Red listened. Indeed, he could scarcely help hearing what was being said without leaving the office. One of the voices he recognized as that of Bill Hanley, foreman of D-21, nearly 100 mi. north of Ryan's territory. Another voice was that of Brittan, the road-master, and the third voice Red judged to be that of Henderson.

"—under the circumstances," Henderson was saying, "I'm afraid we'll have to relieve you, Hanley. Mr. Brittan, as you have heard, says that there is not the slightest doubt of the cause of the wreck. It appears to me like a case of negligence. It was a part of your duties to examine your switches and to know their condition. In addition to it being your duty, Mr. Brittan has often warned you about a close inspection of the points. Yet in spite of this you allowed a switch point to gap open enough so that a sharp flange on a car caught it and split the switch, derailing 14 cars and resulting in a serious loss to the company. That's a bad combination, Mr. Hanley—a loose switch point and a sharp flange. You should have been on your guard. It would not have taken you over 30 min. at the outside to have respiked the stand or to have changed the dial—whichever was needed—"

Red listened to this intently, wondering the while why Henderson was taking Hanley's case up personally. He had heard that there had been a bad derailment on the north end of the sub-division a couple of days back, but not until now had he heard what caused it. Loose switch points! The very thing for which he had been reported! Testimony that they were dangerous was being given almost before his very eyes. His case against the maintainer didn't look so good when viewed with this evidence. With a shock he realized that it wasn't good, and that he was allowing his personal feelings to blind him to the real merits of the controversy. Being perfectly frank with himself he had to admit that his points were a trifle loose and it certainly would not help his reputation to attempt to defend such a condition. He had, of course, realized that a loose switch point is dangerous to the safety of trains—but Ryan always thought this of the other fellow's switches—never his own. His resentment towards Cassidy quickly vanished and a feeling of anxiety took its place. With a start it came to him that what

Henderson had just said to Hanley was equally true in his case—only he hadn't been caught yet. But for all he knew, though, some train might be piled up right now at his passing track switches. It was unlikely, he told himself, but still the thought lingered in his mind. There was still time to respoke the switches before quitting time if he

hurried back on the first train. Picking up his hat he started for the door. The stenographer saw him leaving.

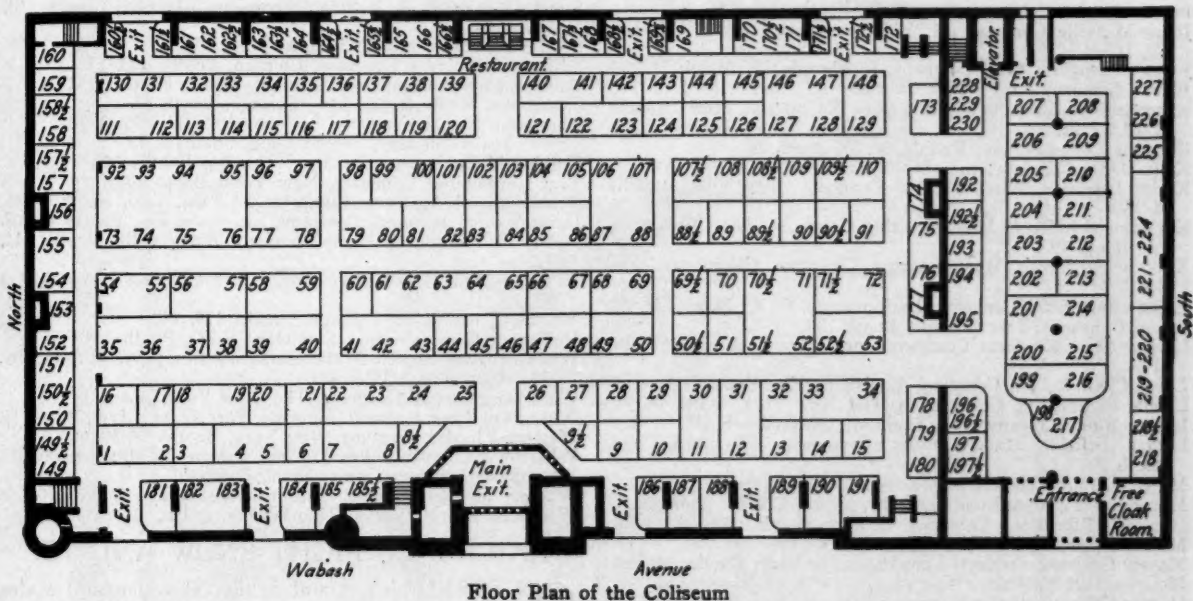
"Aren't you going to wait? Mr. Henderson should be through in a few minutes now."

"No," replied Red, "I can't spare the time. I've got some work that needs attention right away."

National Railway Appliances Exhibit

THE board of directors of the National Railway Appliances Association has completed the assignment of space for the twelfth annual exhibit which will be held, as heretofore, during the week of the convention of the American Railway Engineering Association at the Coliseum, Chicago, the time this year being March 15-18, inclusive. A total of 166 firms, or 13 more than last year, have been awarded space. The list includes 32 new members. The accommodation of the additional number of exhibitors was accomplished without changing the general floor plan which has proved so successful in past years, but in certain cases reducing to a limited extent the space used by some exhibitors last year.

American Vulcanized Fibre Company, Pittsburgh, Pa., Booth 126.
Anchor Company, New York, Booth 192½.
Armco Iron Culvert & Flume Manufacturers' Association, Middletown, Ohio, Booths 99, 100.
Austin Company, Cleveland, Ohio, Booths 158, 158½.
Balkwill Manganese Crossing Company, Cleveland Ohio, Booth 115.
Barrett Company, New York, Booths 107½, 108.
Bay City Foundry & Machinery Company, Bay City, Mich., Booth 3.
Benjamin Electric Manufacturing Company, Chicago, Booths 152, 153.
Bethlehem Steel Company, Bethlehem, Pa., Booths 199, 216.
Boss Nut Company, Chicago, Booths 1, 2.
Blaw-Knox Company, Pittsburgh, Pa., Booth 136.
Bryant Zinc Company, Chicago, Booths 154, 155.



Floor Plan of the Coliseum

The list of exhibitors who have been assigned space, together with their locations, as follows:

Adams & Westlake Company, Chicago, Booths 87, 88, 106, 107.
Adams Motor & Manufacturing Company, Chicago, Booths 218, 218½.
A. G. A. Railway Light & Signal Company, Elizabeth, N. J., Booths 39, 40.
Air Reduction Sales Company, New York, Booths 167½, 168.
Alexander Crossing & Equipment Company, Chicago, Booth 171½.
Alexander Milburn Company, Baltimore, Md., Booths 165, 166.
American Abrasive Metals Company, New York, Booth 167.
American Chain Company, Inc., Bridgeport, Conn., Booth 70.
American Hoist & Derrick Company, St. Paul, Minn., Booth 88½.
American Kron Scale Company, New York, Booth 125.
American Malleable Castings Association, McKee's Rocks, Pa., Booths 221, 222, 223, 224.
American Rail Joint Company, Philadelphia, Pa., Booth 161½.
American Railroad Signal Supervisors' Association, Chicago, Booths 226, 227.
American Railway Bridge & Building Association, Chicago, Booths 226, 227.
American Spike Company, New York, Booth 6.
American Steel & Wire Company, New York, Booths 51½, 52, 70½, 71.
American Valve & Meter Company, Cincinnati, Ohio, Booths 130, 131, 132.

Buda Company, Chicago, Booths 61, 62, 63, 64, 65.
Buffalo Forge Company, Buffalo, N. Y., Booths 228, 229, 230.
Cambria Steel Company, Philadelphia, Pa., Booths 71½, 72.
Carbic Manufacturing Company, Duluth, Minn., Booth 14.
Carter Bloxonend Flooring Company, Chicago, Booth 225.
Chicago Bridge & Iron Works, Chicago, Booths 52½, 53.
Chicago Flag & Decorating Company, Chicago, Booth 187.
Chicago Malleable Castings Company, West Pullman, Ill., Booth 142.
Chicago Pneumatic Tool Company, Chicago, Booths 133, 134.
Chicago Railway Signal & Supply Company, Chicago, Booths 77, 78.
Clark Car Company, Pittsburgh, Pa., Booth 135.
Cleveland Frog & Crossing Company, Cleveland, Ohio, Booth 90½.
Copper Clad Steel Company, Chicago, Booth 213.
Crerar, Adams & Co., Chicago, Booth 28.
Detroit Graphite Company, Detroit, Mich., Booth 108½.
Diamond State Fibre Company, Bridgeport, Pa., Booth 13.
Dickinson, Paul, Inc., Chicago, Booth 96.
Dilworth Porter & Co., Pittsburgh, Pa., Booth 27.
Duff Manufacturing Company, The, Pittsburgh, Pa., Booth 84.
Edison Storage Battery Company, Orange, N. J., Booth 21.
Edison, Inc., Thos. A., New York City, Booth 20.
Electric Storage Battery Company, The, Philadelphia, Pa., Booth 60.
Equipment Corporation of America, Chicago, Booth 181.

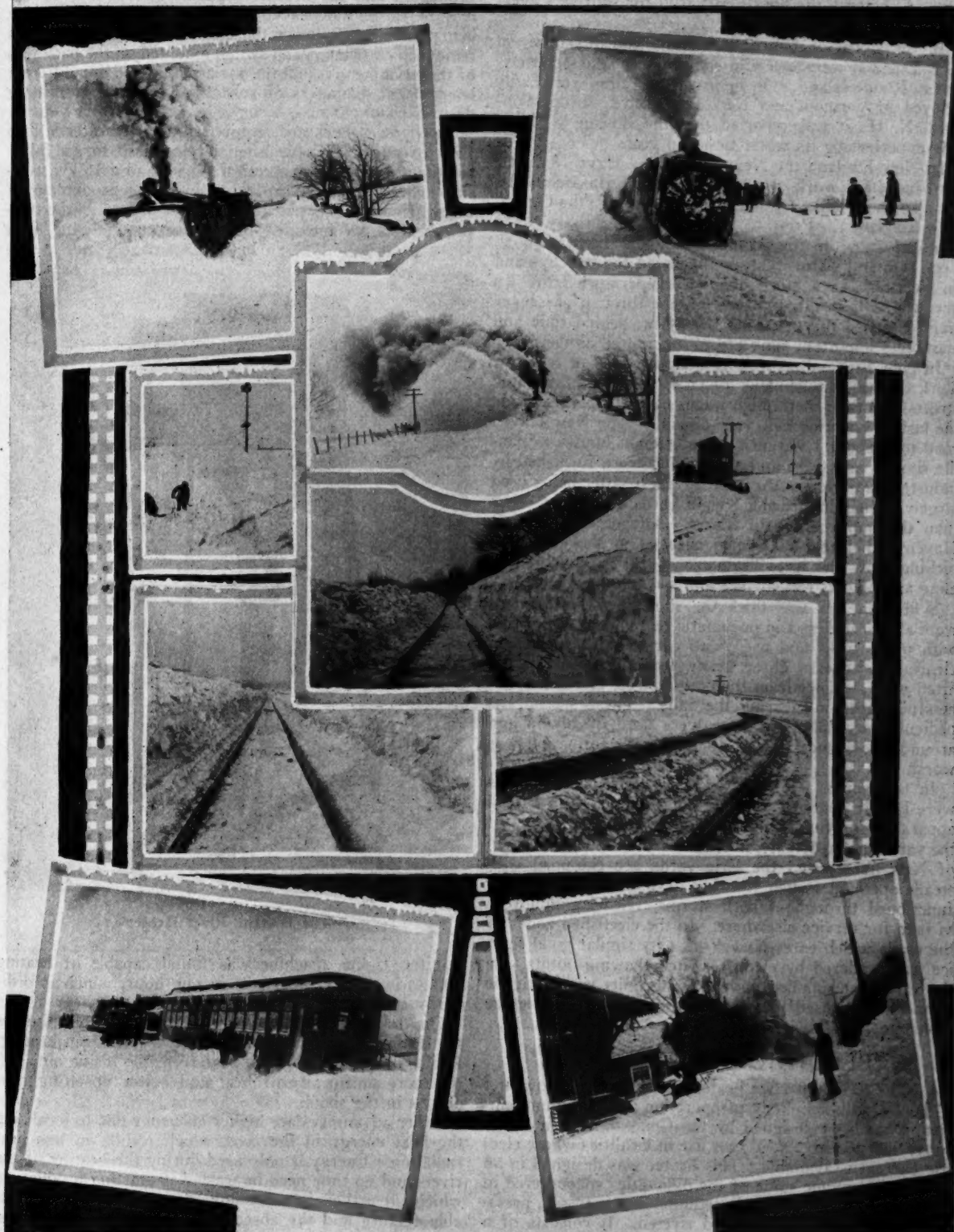
- Eymon Crossing Company, The, Marion, Ohio, Booth 169½.
 Fairbanks Company, The, New York, Booths 137, 138.
 Fairbanks, Morse & Co., Chicago, Booths 73, 74, 75, 76, 92, 93, 94, 95.
 Fairmont Gas Engine & Railway Motor Car Company, Fairmont, Minn., Booths 41, 42, 43.
 Federal Signal Company, Albany, N. Y., Booths 47, 48.
 Federal Sign System (Electric), Chicago, Booth 169.
 Frog, Switch & Manufacturing Company, The, Carlisle, Pa., Booth 190.
 General Electric Company, Schenectady, N. Y., Booths 35, 36, 37.
 General Railway Signal Company, Rochester, N. Y., Booths 49, 50.
 Gilbert & Barker Manufacturing Company, Springfield, Mass., Booth 144.
 Gosso Company, The, Chicago, Booth 188.
 Gould Storage Battery Company, Chicago, Booths 157, 157½.
 Graver Corporation, The, East Chicago, Ind., Booths 96, 97.
 Gurley, W. & L. E., Troy, N. Y., Booth 69½.
 Hall Switch & Signal Company, Garwood, N. J., Booths 85, 86.
 Hatfield Rail Joint Manufacturing Company, Macon, Ga., Booth 166½.
 Hayes Track Appliance Company, Richmond, Ind., Booths 140, 141.
 Hazard Manufacturing Company, Wilkes-Barre, Pa., Booths 18, 19.
 Hebard, W. F., Chicago, Booths 182, 183.
 Hubbard & Co., Pittsburgh, Pa., Booth 143.
 Hyatt Roller Bearing Company, New York, Booth 118.
 Imperial Belting Company, Chicago, Booth 189.
 Ingersoll-Rand Company, New York, Booths 206, 209.
 Johns-Manville Company, H. W., New York, Booths 174, 175, 176, 177.
 Jones & Laughlin Steel Company, Pittsburgh, Pa., Booth 51.
 Jordan Company, O. F., East Chicago, Ind., Booths 56, 57.
 Kalamazoo Railway Supply Company, Kalamazoo, Mich., Booths 22, 23, 24, 25.
 Kaustine Company, Inc., Buffalo, N. Y., Booth 29.
 Kelly-Derby Company, Inc., Chicago, Booths 11, 30.
 Kerite Insulated Wire & Cable Company, New York, Booths 68, 69.
 Keystone Grinder & Manufacturing Company, The, Pittsburgh, Pa., Booth 193.
 Kilborne & Jacobs Manufacturing Company, Columbus, Ohio, Booth 45.
 Lackawanna Steel Company, Lackawanna, N. Y., Booths 33, 34.
 Lehon Company, The, Chicago, Booth 109.
 Liberty Steel Products Company, Inc., New York, Booths 201, 214.
 Long, Chas. R., Jr., Company, Louisville, Ky., Booth 89½.
 Lundie Engineering Corporation, The, New York, Booth 145.
 Lufkin Rule Company, The, Saginaw, Mich., Booth 121.
 Luther Grinder Manufacturing Company, Milwaukee, Wis., Booth 208.
 M. W. Supply Company, Philadelphia, Pa., Booth 101.
 Macomber & Whyte Rope Company, Kenosha, Wis., Booth 90.
 MacRae's Blue Book Company, Chicago, Booth 9½.
 Madden Company, The, Chicago, Booths 194, 195.
 Massey Concrete Products Corporation, Chicago, Booths 54, 55.
 McGraw-Hill Publishing Company, New York, Booth 8½.
 Mercury Manufacturing Company, The, Chicago, Booths 116, 117.
 Miller Train Control Corporation, Danville, Ill., Booths 197, 197½.
 Monroe Calculating Machine Company, New York, Booth 9.
 Mudge & Co., Chicago, Booths 127, 128, 146, 147.
 National Carbon Company, Inc., Cleveland, Ohio, Booths 150, 150½, 151.
 National Indicator Company, Long Island City, N. Y., Booth 156.
 National Lead Company, New York, Booth 113.
 National Lock Washer Company, The, Newark, N. J., Booth 192.
 National Malleable Castings Company, The, Cleveland, Ohio, Booth 102.
 National Railway Appliances Association, Chicago, Booths 198, 217.
 National Surface Guard Company, Chicago, Booth 211.
 National Water Main Cleaning Company, New York, Booth 172.
 Nichols & Bro., Geo. P., Chicago, Booth 173.
 North American Engine Company, Algona, Iowa, Booths 196, 196½.
 Ogle Construction Company, Chicago, Booths 12, 31.
 Okonite Company, The, Passaic, N. J., Booth 16.
 O'Malley Beare Valve Company, Chicago, Booth 114.
 Oxweld Railroad Service Company, Chicago, Booth 10.
 P. & M. Company, The, Chicago, Booths 122, 123.
 Page Steel & Wire Company, New York, Booths 81, 82.
 Peyton Safety Rail Joint Company, Centralia, Ill., Booth 172½.
 Pittsburgh-Des Moines Steel Company, Pittsburgh, Pa., Booth 83.
 Pocket List of Railroad Officials, New York, Booth 26.
 Positive Rail Anchor Company, Marion, Ind., Booths 178, 179, 180.
 Protective Signal Manufacturing Company, The, Denver, Colo., Booth 17.
 Pyrene Manufacturing Company, Chicago, Booth 186.
 Pyro-Non Paint Company, Inc., New York, Booth 160½.
 Q & C Company, New York, Booths 120, 139.
 Rail Joint Company, The, New York, Booths 79, 80.
 Railroad Herald Company, The, Atlanta, Ga., Booth 165½.
 Railroad Supply Company, The, Chicago, Booths 104, 105.
 Railway Review, Chicago, Booth 44.
 Ramapo Iron Works, Hillburn, N. Y., Booths 109½, 110.
 Reade Manufacturing Company, Hoboken, N. J., Booth 191.
 Reading Specialties Company, Reading, Pa., Booth 91.
 Richards-Wilcox Manufacturing Company, Aurora, Ill., Booths 170, 170½, 171.
 Roadmasters' & Maintenance of Way Association, Sterling, Ill., Booths 226, 227.
 Roberts & Schaefer Company, Chicago, Booth 89.
 Safe Lock Switch Machine Company, Lexington, Ky., Booth 168½.
 Sellers Manufacturing Company, Chicago, Booth 124.
 Signal Accessories Company, New York, Booth 119.
 Simmons-Boardman Publishing Company, New York, Booth 46.
 Snow Construction Company, T. W., Chicago, Booth 50½.
 Southern Pine Association, New Orleans, La., Booth 204.
 Southern Railway Supply & Equipment Company, St. Louis, Mo., Booths 161, 162, 162½.
 Squire Cogswell Company, Chicago, Booth 159.
 Standard Asphalt & Refining Company, Chicago, Booths 163, 163½, 164.
 Steel Sales Corporation, Chicago, Booth 202.
 Sullivan Machinery Company, Chicago, Booths 203, 212.
 Sumner Engine Company, Fairmont, Minn., Booths 7, 8.
 Templeton, Kenly & Co., Ltd., Chicago, Booth 32.
 Thompson Signal Company, Los Angeles, Cal., Booth 184.
 Toledo Scale Company, Toledo, Ohio, Booths 4, 5.
 Torchweld Equipment Company, Chicago, Booths 149, 149½.
 Track Specialties Company, New York, Booth 205.
 Train Control Appliance Company, El Paso, Tex., Booth 164½.
 Union Switch & Signal Company, Swissvale, Pa., Booths 66, 67.
 U. S. Wind Engine & Pump Company, Batavia, Ill., Booths 111, 112.
 U. S. Light & Heat Corporation, Niagara Falls, N. Y., Booths 185, 185½.
 Verona Tool Works, Chicago, Booths 129, 148.
 Volkhardt Company, Inc., Stapleton, N. Y., Booth 160.
 Walls Frogless Switch & Manufacturing Company, Kansas City, Mo., Booths 219, 219½, 220.
 Waterbury Battery Company, The, New York, Booth 38.
 Wayne Oil Tank & Pump Company, Fort Wayne, Ind., Booth 15.
 Western Electric Company, New York, Booths 58, 59.
 Wharton & Company, Wm. Jr., Inc., Easton, Pa., Booths 200, 215.
 Wheaton & Probasco, Ionia, Mich., Booth 207.
 Woolery Machine Company, Minneapolis, Minn., Booth 210.
 Wyoming Shovel Works, The, Wyoming, Pa., Booth 103.

RAILROADS FIGHT SNOW AND ICE

ON FEBRUARY 4 and 5, the New England states, New York and Pennsylvania were visited by one of the most severe storms in history. In many localities throughout this territory the storm caused an almost complete paralysis of freight traffic and only by strenuous efforts were the roads enabled to keep milk and passenger trains moving. On February 16, and before sufficient time had elapsed to permit the roads to recover from the first storm, a second storm visited the same districts. In the vicinity of Rochester, N. Y., and Buffalo, where approximately 24 in. of snow fell, the second storm is said to have been the worst ever experienced. At Syracuse, N. Y., the thermometer registered 10 deg. below zero and all railroad lines north of that city reported no trains moving on Monday, February 16.

The few days that elapsed between the two storms were mild and a general thaw ensued. This reduced the first snow to slush on which the snow of the second storm fell. The cumulative effects of two record snow falls within ten days' time, complicated by the ice conditions caused by the slush remaining from the first snow, and the low temperatures which accompanied the second storm, cre-

Railroading Here and There



Three top and two bottom photos copyright International Film Service

BLIZZARD HITS EASTERN STATES

Three Top Views—Rotary Plow at Work Near Dunkirk, N. Y.
Center—On the Pennsylvania in Western New York and Around Philadelphia.
Bottom—Trains Stalled Near Boston.

ated a situation for the maintenance departments of the roads serving the affected territory which was difficult in the extreme. In many localities the situation was complicated by a serious shortage of men and in recruiting forces the railroads were in competition with municipalities. As a result the hourly rate paid for shovelers averaged around one dollar.

In the storm of February 4 and 5 the difficulties in New England were worse in southeastern Massachusetts and in Rhode Island. On February 16 trains were badly delayed in Vermont and New Hampshire. From Concord, N. H., it was reported that the Boston & Maine was experiencing its worst tie-up in years.

In New England the New York, New Haven & Hartford had hard work, not only in eastern Massachusetts, but also on its line west of the Hudson River (the Central New England). Prior to the storm of February 4 the depth of snow on the ground was about 12 in. Snow, sleet, rain and warm weather alternated for ten days and on February 15 a quick drop in temperature froze ice over the rails in many places. Some through passenger trains reached their destinations 24 hr. behind time and many less important runs had to be omitted altogether.

In New England, as well as along the lines of the New York Central, the demands of cities for men in cleaning streets, and the general high wages paid to laborers, made the task of securing help very difficult. The New Haven road took about 1,300 men out of freight houses to handle shovels and picks and about 1,700 were furnished by industries adjacent to the railroad, these latter being used largely to help in clearing freight yards and tracks other than the important main tracks. Altogether, the New Haven had nearly 8,000 men engaged in shoveling and picking snow and ice. Train crews also did much shoveling and officers ran engines and snowplows.

Where the ice was thick the snowplows and flanges were almost useless and pneumatic tie tampers were fitted with prone picks and used with considerable success in clearing switches. Three heavy Jordan spreaders were fitted with steel teeth on their nose-piece, and were successfully used in clearing the rails. These special expedients for dealing with ice were used mainly in and around Providence, R. I., where the ice formation was worst.

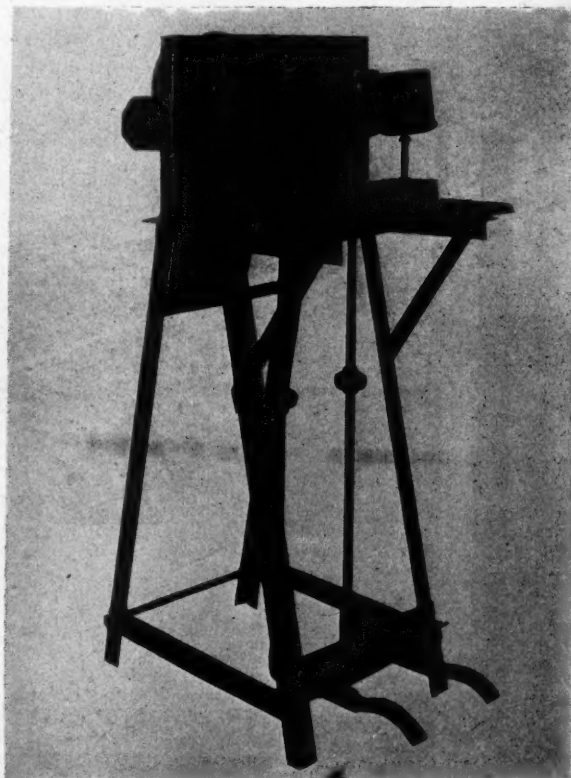
In the vicinity of New York the terminal difficulties were largely confined to yards not equipped with special apparatus for combating snow and ice conditions. Of the yards in Jersey City, portions of the Central Railroad of New Jersey and the Erie yards are equipped with steam operated switch thawing devices. These devices functioned throughout both storms, releasing hundreds of men for service elsewhere. In the electrified zones of the roads which enter New York City similar good service was rendered by electric switch thawing outfits. In the yards not supplied with thawing units pneumatic tie tampers were used to great advantage in removing ice from frogs and switches.

ELECTRIC RIVET HEATING

AN ELECTRIC rivet heater which embodies low first cost with simplicity of operation and maximum efficiency has been designed by the General Electric Company, Schenectady, N. Y., for use in localities where electric current is available. This heater was designed in an effort to overcome some of the difficulties encountered in heating rivets by the usual methods, that is to say, previous to their being driven and riveted. It consists of a transformer rated at 15 kw., mounted on angle iron legs which may be fitted with wheels. Two copper bars fitted with heavy air-cooled electrode blocks of cast copper are

provided at the front of the transformer. Under these is another copper block which acts as a support and electrical connection for two rivets in series. When the rivets are stood up on the block and the electrodes are allowed to drop on the heads of the rivets, the circuit is completed and the heating begins. The two electrodes may be raised independently by two foot pedals, gravity being sufficient to lower the electrodes when the foot is removed. A primary tap switch mounted on the back legs of the machine gives all the variation needed for different lengths and diameters of rivets and the rate of heating desired.

Two power lines are required for each heater. Two sizes of machines have been developed so far, a 5-kw. two-jaw heater for rivets up to $\frac{1}{2}$ in. and a 15-kw. two-jaw heater for rivets up to $\frac{3}{4}$ in. The production of heated rivets is 5 lb. per kilowatt hour and while the two-jaw heaters are intended for the use of one gang, in a



The Electric Rivet Heater

test the 15-kw. machine was found capable of heating 500 $\frac{1}{2}$ -in. by $1\frac{1}{4}$ -in. rivets in one hour, which is ordinarily enough for two gangs of gun riveters.

One of the advantages claimed for these machines is the elimination of waste of rivets due to uneven heating. In these heaters the rivets heat from the inside out, giving more uniformity of heat and better upsetting conditions in the shank.

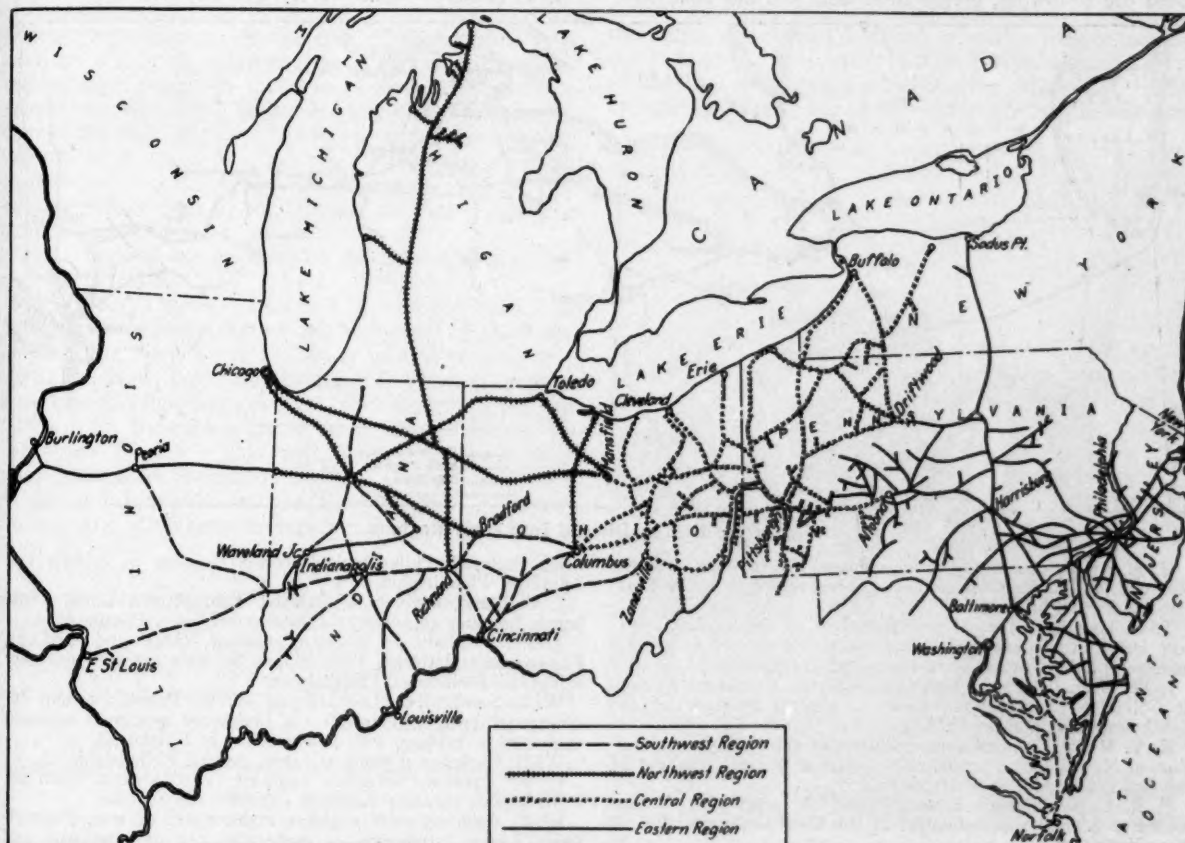
Other advantages are higher efficiency due to localizing the heat energy in the rivet which results in less heat radiation. Energy is only used during the heating of the rivets and no time need be wasted in starting production, which all makes for economy in operation. The portable feature and the absence of fire, smoke and gases, makes these machines particularly adaptable to locations where forges cannot be utilized, owing to inability to get fuel to the forge and ashes away.

PENNSYLVANIA AND ERIE ROADS REORGANIZE

Each System Is Subdividing Its Lines Into Four Operating Regions to Decentralize Control and Increase Supervision

THE MOST interesting development that has come to light thus far as a direct consequence of the return of the roads to private management is the radical reorganizations of the Pennsylvania and Erie systems which are being made, effective March 1. It is, no doubt, largely a matter of coincidence that these two properties, which occupy approximately parallel locations, have announced almost simultaneously plans for reorganization that are similar in many respects. On the other hand, this is a tendency of far-reaching influence and it may be expected that similar action will be taken by other

on the east to Buffalo on the north and Columbus, Ohio, and Crestline on the west, and contains 3,650 miles of line. The Northwestern region extends from Columbus, Ohio, to Chicago, and contains 1,750 miles of line. The Southwestern region consists of the territory bounded by Columbus, Cincinnati and St. Louis and also contains 1,750 miles of line. One of the most pertinent and important results of this rearrangement is the fact that all of the Pittsburgh territory lies within the limits of one region. The objects to be attained by this subdivision of the Pennsylvania property is explained in a statement



Map of the Pennsylvania System as Subdivided

roads. In the main, the plans for reorganization or rearrangement of the systems on both the Erie and the Pennsylvania embody a division of those lines into four regions, each with a complete independent operating staff. Owing to the much greater mileage, the organization on the Pennsylvania involves a more elaborate personnel and will carry with it a more independent management of each of the four grand divisions than is the case with the Erie, but the general plan is much the same.

THE PENNSYLVANIA REORGANIZATION

The nature of the subdivision of the Pennsylvania is clearly shown on the map. The Eastern region extends roughly from New York on the east to Altoona on the west and Washington on the south, and contains 4,250 miles of line. The Central region extends from Altoona

given out by Samuel Rea, president of the Pennsylvania system, from which the following excerpts are taken:

"The Pennsylvania system consists of about 12,000 miles of line in a territory measuring in greatest extent from east to west about 900 miles and from north to south, 700 miles. In it are found practically all the diversities of industry, agriculture, mining, commerce and population known to our country. We believe it to be in the highest degree desirable that the public and employees in all portions of this great territory should be in convenient touch with the responsible executive authority under which this railroad system is to be operated, and the directors and management have planned the new organization accordingly.

"To accomplish these results, the system will be divided into four regions, each in charge of a vice-president, the headquarters of the respective regions to be at Philadelphia, Pittsburgh, Chicago and St. Louis. These vice-presidents will have direct personal responsibility for the efficiency of the railroad service in their respective regions and for maintaining better and closer relations between the railroad, its employees and the public.

F. J. Stimson, division superintendent, Pennsylvania Lines, at Richmond, Ind., has been made chief engineer maintenance of way, Southwestern region, with headquarters at St. Louis.

REORGANIZATION OF THE ERIE

In the case of the Erie, each of the regions is placed in the charge of a manager, who will report to the general manager of the system, but will be in practically entire charge of all matters in his particular region. Each regional manager will have a staff consisting of a regional engineer, a mechanical superintendent, a general freight and passenger agent, a superintendent of transportation, a claim agent, an auditor, an assistant treasurer, a storekeeper and a chief of police. The divisional organizations under each regional manager will be retained approximately as at present. The regional engineer, regional superintendent of transportation, regional general freight and passenger agents, etc., will each report directly to the regional manager, but in order that their work may be properly co-ordinated each will also report indirectly to his respective department officer on the general manager's staff, or to other officers at the head of the railway organization. In the case of the regional engineer, he will be in entire charge of all construction and maintenance except in the case of more important developments which will be carried out under the supervision of the chief engineer. It will be noted that purchasing will be centralized. Each region will have a regional storekeeper, but not a regional purchasing agent. Purchasing will be done by the office of the vice-president in charge of purchases.

Four regions are outlined on the map and described roughly as follows:

New York Region. This will include the lines from Jersey City to Susquehanna and branches, or more specifically the New York, Delaware and Wyoming divisions; the New York, Susquehanna & Western, and the terminals and lighterage in New York harbor. The headquarters for the region are to be at Jersey City.

Hornell Region. This will include the lines from Susquehanna to Rochester, Buffalo, Dunkirk and Salamanca and branches, or the Susquehanna, Rochester, Buffalo and Allegheny divisions. Headquarters are to be at Hornell.

Ohio Region. This will include the lines from Salamanca to Cleveland and Cincinnati and branches, or the Kent, Mahoning and Meadville divisions. Headquarters are to be at Youngstown, Ohio.

Chicago Region. This will include the Chicago & Erie and branches from Chicago to Marion, or the Marion division and the terminals at Chicago. Headquarters are to be at Chicago.

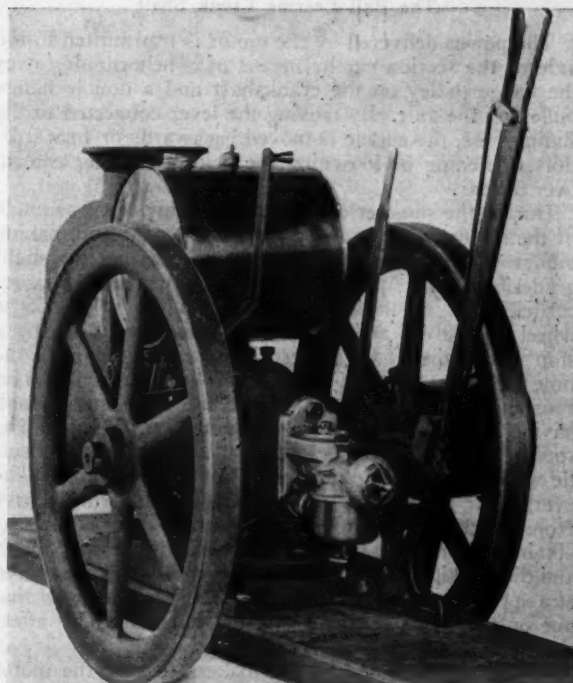
The general manager under this reorganization is Robert S. Parsons, who prior to federal control was assistant to the president and chief engineer, and later assistant to the president and general manager, and who was chief engineer during federal control. Robert C. Falconer, who was corporate engineer during the period of federal control, becomes assistant to the president and chief engineer.

J. J. Mantell, terminal manager, New Jersey Shore terminals at Jersey City during federal control, becomes manager of the New York region; R. E. Woodruff, general superintendent of the Lines West at Youngstown, Ohio, becomes manager at Hornell, N. Y.; W. A. Baldwin, general manager of the Erie system during federal control, with office at New York, becomes manager at Youngstown, Ohio, and A. E. Wallace, assistant general superintendent of the Lines West at Youngstown, Ohio, becomes manager of the Chicago district. Of the four managers, two, W. A. Baldwin and R. E. Woodruff, are engineers.

J. C. Patterson, now principal assistant engineer at New York, will, under the reorganization, become regional engineer of the New York district; W. J. Foster, now assistant superintendent of construction at New York, becomes regional engineer at Hornell; Harold Knight, now assistant superintendent of maintenance at New York, becomes regional engineer at Youngstown, Ohio, and J. R. Sexton, division engineer at Huntington, Ind., becomes regional engineer of the Chicago district. Galen B. Owen, now superintendent of maintenance at New York, will be attached to the chief engineer's staff in charge of maintenance matters.

THE NEW FAIRMONT BALL-BEARING GAS ENGINE

THE FAIRMONT Gas Engine & Railway Motor Car Company, Fairmont, Minn., has recently developed a new motor made in 4 hp. and 6 hp. models, which embodies several new features bearing directly on the question of durability with low maintenance cost. In general, the motor, which was designed primarily for section car work, is of the horizontal, two-cycle type, mounted on a sliding base and having a ball-bearing crankshaft. The cylinder and crankcase of this model are cast in one unit

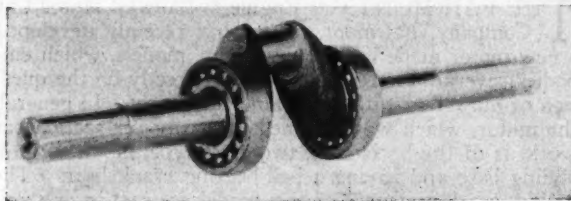


Control End of the New Engine

from semi-steel with a removable cylinder head held by six nuts, a copper asbestos gasket being used between the head and the cylinder flanges. The water jacket, which is held in place by a single large hexagonal nut, has a funnel top for convenience in filling with water, which is closed by a hand screw plug. A steam escape pipe has been installed to carry off any steam that may be generated. The fuel tank is mounted on top of the cylinder with a copper gas line leading to the carburetor unit, which is comprised of the carburetor, check valve and hand hole plate, the major part of it being made of a single aluminum casting weighing about one pound.

The crankshaft, which is the chief feature of this new type motor, is made of heat-treated carbon steel of large size and mounted on two self-aligning ball bearings, one on

each side. These bearings are housed in side plates which are bolted to the crankcase. Two flywheels of large diameter are mounted on the crankshaft, one on each end. The connecting rod is made of electric steel fitted at the piston end with a phosphor-bronze bushing and at the crankshaft end with renewable die-cast bushings. The semi-steel piston has four rings, three of which are above the piston pin and doweled, the piston pin being made hollow, of hardened steel and held in place by a locked set screw passing through the piston boss and the wall of the pin. The crankcase compression or base compression, as it is commonly called, is retained by two special self-tightening packings, one on each side of the motor, consisting of three rings, each of a special material held at the correct tension by a compression spring.



The Ball Bearing Crank Shaft

The power delivered by the motor is transmitted to the axle of the section car by means of a belt running over the flange pulley on the crankshaft and a double flange pulley on the axle. By moving the lever connected to the sliding base, the engine is moved backwards or forwards, thus tightening or loosening the belt and giving control over the car.

During the summer of 1919 an economy test was made of the motor by mounting it on a section car and making numerous runs over a stretch of track having two slight grades and two curves. The distance traveled was recorded by a revolution counter operated by the loose wheel of the car and the running time was taken by a stop watch, the average speed being calculated from the time and the distance traveled. The quantity of fuel consumed was ascertained by the use of a special tank having a calibrated glass tube mounted on the side. The speed of the test car was controlled entirely by the throttle which was set in one position for each test run. The average of the results obtained were plotted in a curve from which it was found that the greatest economy was obtained at a normal speed of from 12 to 18 mi. an hr. and that as high as 65 mi. per gal. of gasoline was secured at a speed of about 15 mi. per hr. It was also found that one or two stops during a run did not materially affect the mileage per gallon of gasoline.

It was then decided by the makers to give the motor a durability test, the first intention being to run the motor continuously until the engine failed or some trouble developed. This was changed later to three long runs and a provision was made for one stop and inspection every 500 hr. The motor was, therefore, put through three non-stop 500-hr. tests, or a total of 1,500 hr. of continuous service. Working conditions were obtained by mounting the motor on a base and belting it to a generator, the throttle being set to operate the engine at a speed of about 800 r.p.m. while pulling a maximum load.

The first inspection developed no wear except a general polishing up of the bearing surfaces with no carbon present and all piston rings free. The second inspection showed a slight amount of carbon on the cylinder head, but none on the piston and no adjustments were necessary. The third inspection disclosed the fact that there had been a small amount of carbon deposited on the piston head and that the connecting rod bearing needed two

0.002 in. shims taken out to make it tight. The crankshaft ball bearings were found to have no noticeable or measurable wear.

POSTERS AS AN AID IN RECLAMATION WORK

AT THE initiative of H. S. Sackett, assistant purchasing agent, the Chicago, Milwaukee & St. Paul is undertaking a campaign to place reclamation work in the maintenance of way and other departments on a more satisfactory, efficient and economical basis. This movement is to be largely educational in character, with the idea of reaching the employees through the aid of posters like the one illustrated on this page. The agency by which this campaign will be conducted comprises a main reclamation committee at the general headquarters of the road to direct the work of subordinate committees having headquarters at various places on the system. The main committee consists of Mr. Sackett (chairman); Macy Nicholson, assistant general manager; W. B. Fos-

\$ SAVE MATERIAL \$

DO YOU REALIZE

A track spike costs	\$0.03	A brake shoe costs	\$0.75
A ordinary 1-inch nut costs . . . . .	.04	An engine oiler costs . . . . .	.75
A track bolt costs . . . . .	.06	A track shovel costs	1.00
A tie plate costs . . . . .	.21	A lantern costs	1.05
An air brake hose costs \$2.35			

DOES IT ASTONISH YOU

TO LEARN THAT THE

Chicago, Milwaukee & St. Paul R.R.

SPENT LAST YEAR FOR

Track spikes . . .	\$107,400	Tie plates	\$306,273
Nuts	108,036	Brake shoes	92,213
Track bolts	67,496	Air brake hose . . .	97,020

Over Three Quarters of a Million Dollars for
Only Six Items

DON'T WASTE MATERIAL

Many of the European nations are already back on a 10 and even 12 hour basis of labor.

We must economize and make every step count, if we are to hold our leadership in the world.

Let's not lag behind. Let's keep "America" up in front and let's make the "Milwaukee" the best operated railroad on earth. All of us together can do it.

\$ SAVE MATERIAL \$

THE RECLAMATION COMMITTEE

ter, general superintendent, lines west; H. R. Warnock, general superintendent of motive power; A. G. Holt, assistant chief engineer, and W. H. Penfield, engineer of track maintenance. Most of the subordinate committees are located at the various railway shops and consist in the main of mechanical and car department officers. One of the committees known as the Savanna-Tomah Shop committee, which will have supervision over the maintenance of way reclamation shops at these two points, is composed of C. B. Woolworth (chairman), inspector of rail. Chicago; John Reinehr, superintendent frog and switch shops, Tomah, Wis.; G. T. Richards, bridge and building material storekeeper, Tomah, and B. C. Johnson, foreman of the railmill, Savanna, Ill.



Creosoted Ties with Screw Spikes and Tie Plates. The Last Word in Timber Preservation.

WOOD PRESERVERS HOLD CONVENTION

Meeting in Chicago on February 10-12 Covered Many
Matters of Interest to Railway Men

THE SIXTEENTH annual meeting of the American Wood Preservers' Association was held at the Hotel Sherman, Chicago, on February 10-12, inclusive. With a registration of over 250 members and guests of this association, the attendance was easily the largest in the history of the organization. Aside from matters relating to the technology of timber preservation and plant operation, the program was devoted very largely to matters relating to the service of railway ties and timbers.

The officers of this association for the past year were: President, J. B. Card, president, Indiana Zinc Creosoting Company, Chicago; first vice-president, A. R. Joyce, Joyce-Watkins Company, Chicago; second vice-president, C. Marshall Taylor, superintendent, Port Reading Creosoting Plant, Port Reading, N. J.; secretary-treasurer, F. J. Angier, superintendent timber preservation, Baltimore & Ohio, Baltimore, Md.

The opening session was called to order at 10 o'clock on Tuesday morning by President Card. The association was welcomed to Chicago by Frederick B. Vose,

chairman of the Ways and Means Committee of the Chicago Association of Commerce. He expressed an appreciation of the value of the Wood Preservers' Association in its efforts to conserve timber and called attention to the necessity for the conservation of men as well as materials. A response to Mr. Vose in behalf of the association was given by J. H. Waterman, superintendent of timber preservation, Chicago, Burlington & Quincy, Galesburg, Ill. In the report of the secretary, Mr. Angier stated that the present membership of the organization was 305, a gain of 23 during the last year. This total includes 74 employees of 33 different railroads and 12 employees of the United States Railroad Administration. The treasurer's report showed a balance of \$714.88. President Card's address related to the difficulties confronting the tie treating industry during the period of the war and concluded with a strong plea for Americanization. An abstract of the papers and reports presented and their discussion on the floor of the convention is given below, placing special emphasis on those features which are of special interest.

The Treatment and Service Records of Ties

THE REPORT of the Committee on Service Records was submitted in several units. One of these comprised the catalogue of tie service test records prepared each year from the records on file at the Forest Products Laboratory, Madison, Wis. This comprised 38 tables covering many different species of wood. Another report covered the service test records of ties on the Delaware, Lackawanna & Western. As stated by George E. Rex, chairman of the general committee, it is the intention of the committee to submit as full a report as possible each year concerning the results secured with treated ties on one road. The report of the sub-committee covering this record follows:

REPORT ON SERVICE TESTS

The Delaware, Lackawanna & Western started the general use of creosoted ties in maintenance and new

construction work during the early part of 1910. It is the general practice of the maintenance department to use treated hardwood ties on curve track and ties of the softer woods on tangent track, all ties being treated by the empty cell (Lowry) process. During the first two months of treating operations all ties were treated with an average retention of $2\frac{1}{2}$ gal. of creosote per tie. Thereafter ties 6 in. thick were treated with an average retention of $2\frac{1}{2}$ gal. of creosote per tie, and those 7 in. thick with an average retention of $3\frac{1}{2}$ gal. per tie, in order that the average retention per cubic foot of wood treated should be approximately the same. During the years 1910 to 1917, inclusive, English distillate coal-tar creosote was used as a preservative, while domestic coal-tar creosote solution was used in 1918.

It was proved that the ties manufactured from some of the softer woods required additional protection from

mechanical wear in order that the treated life of the ties should be realized, and the use of large, flat-bottomed maintenance of way men.

tie plates and screw spikes was adopted. On several sharp curves over which there is heavy traffic hook-shoulder tie plates, attached to the treated oak ties with bolts, have been installed to better protect the ties from mechanical wear. After the first two years of plant operation, all ties were adzed and bored, before treatment, for either screw or cut spikes by machines installed at the treating plant.

TREATED TIES REMOVED ON ACCOUNT OF FAILURE					
	1915	1916	1917	1918	Total
Beech	1	..	1	1	3
Gum	6	37	..	30	73
Maple	15	3	11	..	29
Oak .....	..	2	1	..	3
Pine	17	31	30	2	80
Total	39	73	43	33	188

The tracks of the Lackawanna Railroad of New Jersey are constructed of standard D. L. & W. open hearth 91-lb. and 101-lb. rail, screw spikes, flat-bottomed tie plates and creosoted ties and switch timbers. The treated ties were bored for screw spikes with hand boring machines by the track gangs, after which the holes were filled with creosote to insure treatment of any untreated wood around the holes.

There are approximately 200,000 creosoted ties in service, consisting of 25,000 oak, beech, birch and maple; 145,000 pine and 30,000 gum. Since these tracks were constructed in 1910-11, 64 ties have been removed on account of failure, as indicated by the following table:

TREATED TIES REMOVED ON ACCOUNT OF FAILURE				
	1915	1916	1917	Total
Pine	1	12	10	23
Gum	40	..	..	40
Oak	1	..	..	1
Total	42	12	10	64

The conclusions of the committee were as follows:

1. That the best information pertaining to the life of untreated and treated ties can be had from detailed and accurate records of tie renewals over long periods, and that it be recommended that all railroads keep such records.
2. That the treated life of coarsewood ties cannot be obtained when used in tracks of heavy curvature over which there is heavy traffic under the present method of protection against mechanical wear, as practiced on this railroad.
3. Attention should be called to the table of tie renewals, which shows that excellent results are being obtained from the use of creosoted ties.

D. L. & W. TIE RENEWALS

Year	Total miles of track	Total number of ties	Ties Inserted for Renewals		Percentage of total ties inserted to total ties in track	Ties inserted per mile
			Un-treated	Treated		
1908	2,439	6,722,329	676,943	.....	676,943	10.1
1909	2,475	6,813,721	581,952	.....	581,952	8.5
1910	2,500	6,877,974	258,927	163,433	422,360	6.1
1911	2,614	7,186,346	173,815	409,680	583,495	8.1
1912	2,619	7,200,509	180,428	425,498	605,926	8.4
1913	2,644	7,262,170	209,434	534,042	743,476	10.2
1914	2,627	7,242,294	194,512	476,370	670,882	9.3
1915	2,663	7,346,825	304,405	438,832	743,237	10.1
1916	2,656	7,331,287	165,281	352,614	517,895	7.1
1917	2,663	7,349,178	108,629	308,097	416,726	5.7
1918	2,671	7,369,734	83,867	240,199	324,066	4.4

DISCUSSION

J. H. Waterman (C. B. & Q.) read an abstract from the tenth annual report on the test tie sections of the Burlington. Mr. Rex declared that there was now no question but that the wood preservers could preserve ties against decay for as long a time as it was possible to protect them against mechanical wear. F. R. Layng (B. & L. E.) spoke of the work of the tie committee of the American Railway Engineering Association, which he said was thoroughly impressed with the necessity of preservation. F. J. Angier (B. & O.), in referring to

the table in the Lackawanna report, inquired if any allowance was made for the mileage of track included within the limits of turnouts and bridges, to which Mr. Gosline replied that it did not. Mr. Angier said it was important to take this seeming refinement into account, since a calculation on the Baltimore & Ohio showed that about 5 per cent of the track mileage was taken up by switches and bridges which introduced an error in the drawing up of tie test records. Mr. Rex said that this was an important point and stated that the Service Records committee had this matter under consideration and hoped to develop a standard form for the keeping of records which, if adopted by the different railroads, would insure a sufficient uniformity to permit of a comparison of the results obtained on different railroads.

Upon a request by Mr. Rex, Lowry Smith (N. P.) explained a theoretical study he had made of the variation in tie renewals from year to year as obtained from a study of a curve which he had constructed from a basic curve developed by the Forest Products Laboratory showing the average proportion of ties renewed each year from a group of ties having a given average life. By means of the curve he developed, it is possible to illustrate the cycles of maximum and minimum renewals and he pointed out the possibility of drawing wrong conclusions relative to the benefit to be derived from timber treatment.

SEPARATION OF CROSS-TIES

BY HUNTER J. VON LEER

Inspector, Indiana Zinc Creosote Co., Terre Haute, Ind.

The separation of railroad cross ties into special groups is a subject of interest alike to the cross tie producer, distributor, purchaser, maintenance engineer and wood preserver. A broad discussion of the subject necessarily involves their respective viewpoints. It is the present practice to separate cross ties into proper groups according to one or more of the following basic principles: (a) Purchase, (b) absorptive properties, (c) sap-wood content, (d) seasoning properties, (e) track requirements. Relative to the grouping of cross ties, based on their absorptive properties, I believe and present the following proposition for discussion:

Any separation of cross ties for the purpose of improving their treatment is unnecessary and contrary to good practice:

When such separation is based on the *absorptive properties* of the wood;

When the ties are manufactured from *broad leaf trees*;

When the treatment is to *refusal*.

There is not and never has been an adequate return for the expense incurred. It carries an additional cost and does not add to the life or service of the ties. It is the direct cause of much delay—the principal one being car service. It complicates an already difficult labor problem and frequently results in a messed-up storage yard. It increases either directly or indirectly each of the following costs incident to plant operation: Power, local transportation, equipment and upkeep. It requires additional supervision and there remains the direct charge for extra handling.

I further limit the discussion to the species commonly known as broad leaf trees, because of the tendency shown by some advocates of the method to refer always to the great disparity in treating time and absorption volume, as between a red oak and a pine tie. Also when cross ties are not treated to refusal, but according to specifications stipulating an arbitrary and definitely measured quantity of chemical per an arbitrary unit of material, to obtain a reasonably uniform treatment it is neces-

sary to separate, but this discussion is confined to such process where a refusal treatment is known to be safe and desirable—i. e., water solutions and the Card or similar mixtures.

One treating engineer tells me that the maintenance engineers on his system wish ties separated as to hard and soft. Hard and soft in their case refers to the comparative wearing and spike-holding properties of the sticks; in the treater's case, to their comparative resistance to treatment. After considerable investigation I am unable to find reliable data that would justify such an assumption. On the other hand, the statements of many of our authorities correspond closely with the results of personal study, permitting the definite assertion that a separation based on absorptive properties will not parallel one based on mechanical properties.

Several operators advance the argument that it is cheaper to make this separation because of a saving in cylinder time obtained by treating the less refractory woods alone. Experience teaches that it is absolutely advisable to inject and distribute the preservative as thoroughly as possible in all of these species, because the large amount of sap wood common to the class is readily attacked by destructive fungi. In my opinion, any appreciable saving of time is made at the expense of thorough treatment and cannot be otherwise obtained under competent supervision.

A number of authorities admit that the problem of tie separation is very complex, and perforce arbitrary. There is nothing complicated about my plan. I believe a treatment to refusal guarantees a thorough treatment, simplifies plant operation, and by permitting the treatment in the same cylinder load of any or all of the broad leaf woods customarily used for cross ties effects an appreciable economy.

DISCUSSION

W. F. Goltra agreed with the sense of the paper. At one time he also was of the opinion that ties should be separated by species, seasoning, etc., in order to obtain the best results in treatment, but experience showed him that it was not practicable to obtain this separation. In answer to a question by Walter Buehler (The Barrett Company) Mr. von Leer stated that his paper applied only to zinc chloride, since economic conditions did not now permit of the treatment of ties to refusal with creosote and the conclusions of his paper were founded on a treatment to refusal.

F. J. Angier (B. & O.) disagreed with the paper and stated that he had always advocated the separation of the ties, and he contended that this policy was justified by the results secured where this had been practiced, as on the Burlington, where the records obtained and reported by J. H. Waterman (C. B. & Q.) demonstrated the correctness of this policy. He agreed with Mr. von Leer that with ties treated to refusal it would be possible to secure proper treatment of ties mixed indiscriminately in the retort, but he did not understand why there could be any advantage to treat at one time, ties requiring only 5 hours for treatment with ties requiring 10 hours. Mr. Angier also explained the method of handling ties in the yard so that they could be separated without delay or confusion.

RAPID DETERIORATION OF SAP PINE TIES

By C. O. DEABLER

Tie and Timber Agent, Southwestern Region, United States Railroad Administration, St. Louis, Mo.

Reference to rainfall and temperature records of Arkansas, Louisiana and Texas shows that in these three states, in which the principal production took place, the weather conditions prevailing the latter part of 1919

were decidedly abnormal. They were characterized by comparatively high temperatures, excessive and very frequent rainfalls and an absence of sunshine. The humidity during this entire period was abnormally high. All of these circumstances were extremely favorable to the rapid development of all sorts of decay-producing fungi. It is not at all surprising, that with these climatic conditions prevailing throughout a region in which sap pine cross ties have been produced, a marked development of the chief sap pine destroying fungus took place, the spores, we understand, germinating every time it rains. Given the optimum temperature of 85 to 90 deg. F., a sufficient amount of water (which during the months of October and November was present in abundance) and a sufficient amount of oxygen, there was a very rapid development of the fungus.

Another point of interest deals with the rapidity with which ties become infected and subsequently decayed. In ordinary seasons a pine tie, when cut during the latter part of the summer, has usually been found to be free from this infection for at least three or four months. There are, of course, always certain individual pieces which are more readily infected, but on the whole, the rate of decay is as just stated. During the latter part of 1919 this rate was much accelerated. A tie in a lot hauled to the tie yard within 24 hr. after it was made and there stacked in approved fashion on a well-drained cinder-covered yard showed the small knobs of fruiting bodies on the ends after 93 days.

One point in connection with the life history of this fungus, which it is important to remember in all points of this discussion, is that there is a certain definite period when its presence cannot be recognized by an outside inspection of a piece of timber. The fine microscopic threads are distributed in the interior of the wood and it is only when they have more or less developed to maturity that they reappear on the outside in the shape of the fruiting body. This will explain the fact, for instance, that a great many ties were inspected and pronounced perfectly sound, using the best visual inspection possible, and after having been loaded in box cars where no ventilation was possible, and where the optimum conditions for the development of the fungus were obviously present, such ties showed fruiting bodies on the outside after several weeks in transit and could then easily be detected as infected ties.

This may be exemplified by comparing diseases of the human race. Germs may be carried about for a considerable period without it being known, but at a later stage the person so infected becomes readily recognizable, as in the case of smallpox. By this comparison, you will readily understand how a cross tie may appear to be in perfect condition when inspected, yet be infected with fungus that develops at a later date which should not be charged to incompetent inspection, delay in handling or improper treatment.

We all realize and agree that the sap pine tie is not of a desirable wood, compared with the species formerly used by most roads, but the tremendous drain on our hardwood forests, and high prices, brought about by the unusual conditions during the past three years, made it necessary for railroads to consider other than hardwoods. This brought us, naturally, to one of the most available supplies close at home, viz., sap pine. Cross ties were very much in demand and a heavy production was sought in all pine territory. A great deal of this production was in localities where pine cross ties were not formerly produced.

It should also be pointed out that the type of production during the past summer differed considerably from that previously secured, even in sections where pine ties had been produced. In previous years the

number of pine ties produced was limited to the minimum quantity needed by the railroads, usually roads in the territory where such ties were produced. This year no limit was put on production and they came out in such vast quantities that by the end of September there were between three and four million sap pine cross ties on the right-of-way. This flood, furthermore, was brought about rather suddenly. Due to the absence of rain in the growing season, the corn and cotton crops, on which the farmers in the southwest largely depended, were almost a failure, and farmers naturally turned to tie production as one way of obtaining sufficient money to tide over the winter. This will be readily evident from the figures of the number of ties inspected during July, August, September and October in the Southwestern region, which were as follows:

July	1,393,906
August	1,855,822
September	2,624,202
October	2,296,907

While these ties were inspected in the months indicated, a large percentage were probably manufactured several months prior and were not brought to the right-of-way on account of the farming period intervening.

Many of these ties, made as they were by people unfamiliar with pine tie production, were possibly not handled as expeditiously as they should have been in bringing them from the woods to the right-of-way, and a considerable percentage of deterioration probably took place while the ties were still in the hands of producers. But this condition could not be detected until the ties were received.

Attention should also be called to the fact that this very large production took place during a season when wood cut from pine trees was in the best possible condition for rampant infection. It is well known that July, August and September in the South are the worst months for cutting timber from a standpoint of lasting power. These conditions, taken in connection with the extraordinary climatic conditions already mentioned, all contributed to the extensive deterioration which actually occurred.

With this enormous number of ties on the right-of-way, loading and transportation facilities were taxed to the utmost. Weather conditions during October and November also added to the difficulties of handling ties from the ground. Considerable delay in loading was also caused from time to time by strikes among tie loaders. In spite of these conditions, however, tie loading for the Southwestern region showed a steady increase until the end of November.

It would be a hard problem to give all the reasons for the deterioration of the sap pine cross ties in the Southwestern region during 1919. Summing up the situation, however, it was brought about largely by the extraordinary climatic conditions, the unlimited production, congested transportation, and the failure of some producers, not familiar with sap pine preservation, to realize the necessity for the ties getting to the right-of-way before infection had taken place. We must realize the sap pine cross tie will be used in larger numbers than ever before, but permit me to caution you as to its care after production. The sap pine cross tie should reach the treating plant as quickly as possible and be treated at the proper time.

The question of arriving at the proper age of cross ties has also been a subject of interest and discussion in the Southwest. Many plants estimate the age of cross ties when arriving at the plant and add to this age the customary time allotted for the proper seasoning, treating the ties at the expiration of this time. This system

should be corrected, as ties are received quite frequently at treating plants and carded for some date of treatment when they vary several months in age. This results in some ties being treated too green and others beyond the proper time.

My suggestion is to correct this estimating of the age of ties by the use of the dating hammer as soon as it can be applied, and to separate the ties at the treating plant. This may prove expensive handling, but it will pay in the treating of cross ties before they have gone beyond the treating period. A trip to any treating plant should convince one of this. An advertising campaign among the producers will gradually bring about a wider understanding for this necessity and eventually accomplish very satisfactory results.

DISCUSSION

Referring to the unfortunate results occurring as a consequence of long delay in delivery of the ties after cutting them, C. M. Taylor (Port Reading Creosoting Plant) called attention to the fact that the Santa Fe had cut and shipped ties in this same territory for years and had been able to get them out quickly enough to avoid the troubles cited in the paper. In answer to a question as to the practicability of holding untreated sap pine ties for seasoning for a period of six months, Mr. Deabler stated that it was not safe to do this. E. E. Pershall (T. J. Moss Tie Company) called attention to the need for the perfection of some system or standard method for accepting and rejecting ties that could be relied upon to distinguish between the ties that were suffering from incipient decay and those which were not. With the limited information now commonly at hand, a great deal of confusion now exists among producers. This is a matter of great importance because the sap pine tie is and will continue to be used much more extensively than in the past, since, owing to the high price of hardwood, a decreasing amount of hardwood timber will be cut for tie purposes.

OTHER PAPERS ON TIES

A paper on the effect of preliminary steaming in the treatment of air seasoned ties was presented by S. S. Watkins (Watkins Creosoting Company). When the specifications of the United States Railroad Administration which required the use of preliminary steam in the Burnettizing and Card treatments of air seasoned ties became effective in 1919, it was decided by the company with which he is connected to maintain pressure periods of the same duration and intensity as had been the usual practice in order to study the effect of the preliminary steaming. The results obtained were not in any sense experimental, but represented summaries of the daily plant operating records. The relative condition of the ties treated was as nearly the same as could be obtained in ordinary practice. The results of the tests showed that due to the use of preliminary steaming the net absorption in the treatment of red oak ties was increased 12.6 per cent and in the treatment of sap pine ties 52.2 per cent.

C. J. Humphrey (Forest Products Laboratory, Madison, Wis.) presented a paper illustrated by lantern slides describing the various kinds of fungi that are found on timbers used for ties in the Middle West. He pointed out the characteristics of each species and gave an account of the extent of the damage caused by them, differentiating between those that are a serious menace to timber and those that are relatively harmless. E. E. Pershall (T. J. Moss Tie Company) asked Mr. Humphrey a series of questions in an effort to ascertain if there were not some simple rules that could be issued to

inspectors whereby ties infected with harmful fungi could be identified, but Mr. Humphrey's replies indicated

that the problem was too complex to permit of any simple enunciation, such as was suggested by Mr. Pershall.

Preservatives and Plant Operation

A CONSIDERABLE portion of the program was devoted to the discussion of papers and reports relating to the theory of preservation, the details of plant operation and the preparation of timber for treatment. Some of these are mentioned briefly, others are reported under separate headings.

Galen Wood, chemist, Port Reading Creosoting Plant, Port Reading, N. J., described a method for determining zinc chloride penetration based on the principle that zinc ferricyanide liberates free iodine and free iodine in turn gives a dark blue stain with starch solution. Zinc chloride that has been injected into the ties will react with potassium ferricyanide, making zinc ferricyanide, and this in turn will liberate free iodine and give the blue stain. Free iodine can be detected in very minute quantities with starch solution, and can be made a very delicate test, such as detecting minute amounts of zinc chloride in treated ties.

The Committee on Preservatives presented a statement showing that a large number of definitions and specifications had been submitted to the membership for approval, but which had not been adopted by the association owing to the constitutional requirement of an affirmative vote by two-thirds of the total membership and the fact that it had been impossible to get two-thirds of the membership to vote on most of these special points, although in many cases no negative vote had been recorded. The committee, therefore, made a plea for the serious consideration of the matters submitted with the hope that the membership would arrive at some definite conclusion with regard to them.

S. R. Church, The Barrett Company, New York City, presented a supplementary report on the problem of obtaining truly representative samples of the oil in tank cars. He placed great emphasis on the importance of accuracy in this regard because the subsequent chemical analysis is of little value unless the samples are obtained in a way that will insure that they are truly representative. The greatest difficulty is encountered in obtaining samples that will give accurate results in the analysis for the content of water because any water that is present in the oil tends to separate in shipment. The irregularity in the distribution of this water together with the shape of the tank as a horizontal cylinder represent the chief sources of inaccuracy. Mr. Church gave a detailed account of a method developed for giving the proper weighting to samples taken at different depths in the tank in cars of different sizes filled with oils to a varying depth. The mathematics involved in this has been reduced to tables so as to simplify the practical application of this method.

W. E. Jackson, superintendent treating plant, Atchison, Topeka & Santa Fe, Albuquerque, N. M., described a method of determining the amount of water in creosote oil by means of a painted pipe suspended in the tank, the creosote in the bottom of the tank eating the paint from the pipe, while the emulsion in the center loosens it and the water at the top does not affect it, the boundaries of these zones being clearly defined.

SOME NEW IDEAS ON PRESERVATION

Ernest Bateman, chemist in forest products, United States Forest Products Laboratory, Madison, Wis., presented a paper raising a question as to the correctness of the present practice with regard to the character of

creosote oil. He contended that a larger proportion of lower boiling oils would be an advantage and presented data and arguments to show that the loss by evaporation of the low boiling oils does not seriously detract from the wood preserving value. He also maintained that the character of oil found in old timbers which had given long service life did not demonstrate the merit of such oils, since the lighter oils, which may have been largely responsible for the resistance to decay, have been largely evaporated during the period of service. Based on these contentions, Mr. Bateman concluded his paper with the following questions:

1. Since these light oils containing 60 per cent or more of oil distilling below 235 deg. C. have preserved both poles and ties beyond their mechanical life, is there any need of a higher boiling oil?
2. Would we not obtain a better penetration and hence longer life by using a low boiling oil?
3. Could these light oils be obtained cheaper than our standard creosote?
4. Since the toxicity of coal tar creosote seems to be measured by the amount of oil distilling below 270 deg. C., ought we not to put a limit upon the amount which may distill above that point in both our creosote and our tar solutions?

In discussing this paper A. E. Larkin (Republic Creosoting Company) felt that it was not entirely correct to assume that it was the missing oils which had been responsible for the preservation of a pile or a tie up to the time that decay took place. S. R. Church (The Barrett Company) referred to the shortage of creosote oil and stated that he believed the present problem was not to modify the present composition of oil, but to make the best economic use of the material now available. E. B. Fulks (American Tar Products Company) said that there was no question as to the value of the light oils while they remained in the wood, but that unfortunately they did not last long. For this reason he believed that the majority of those interested in timber preservation preferred oils having the proportion of heavy fractions now commonly obtained. Walter Buehler (The Barrett Company) called attention to the possibility of greater evaporation losses in plant operation should oils with a larger proportion of low boiling fractions be used, especially with the empty cell process.

HOW WOOD PRESERVATIVES ACT

Mr. Bateman presented a second paper on a Theory of the Mechanism of the Protection of Wood by Preservatives. There are at least two methods of protecting wood from destruction by living organisms: First, by controlling the conditions necessary for the life of the organism and thus inhibiting its growth, and, second, by the injection of a material which will kill or poison the organism itself or any enzymes through which it may accomplish its work. In general, except in isolated cases, the first of these means, that of controlling conditions necessary for the life of the organism, is beyond our ability if we wish to use the wood for its usual commercial purposes, since it means control of the temperature, of the moisture content and of the air content of the wood itself. It is therefore necessary to resort to the use of a poison. It would seem reasonable to expect that any material which is poisonous enough to kill an organism of any kind must first be soluble in the body fluids of that organism, at least to such an extent as to permit a lethal dose to be taken at one time. The organisms which attack wood have chiefly water as their

body fluids, so that in wood preservation at least it is necessary that in order for a material to be toxic it must first of all be soluble in water, the degree of solubility being that which will permit of a water solution of a sufficient strength to be poisonous to the organism. All wood preservatives must, therefore, be soluble in water to a certain extent, and in this respect at least, oil solutions and inorganic salt solutions must be similar, differing chiefly in the mechanism by which they provide a reserve supply of the poison.

The theory proposed was summarized as follows:

1. Any substance to be an efficient wood preservative must be soluble in water at least to the extent of producing a toxic water solution.
2. Creosote oil may be considered as consisting of two groups of compounds, one of these being sufficiently soluble in water to render it toxic, the other insoluble and hence not toxic.
3. The non-toxic oil acts as a reservoir for the toxic oils and feeds them automatically, when needed, to the moisture in the wood.
4. The difference between oil preservatives and inorganic salt preservatives as far as this theory is concerned, is in their method of retaining the reserve supply of toxic materials. Zinc chloride has no reserve supply, all the material being soluble in the usual amount of moisture present in air-dry wood. Sodium fluoride may have a reserve supply in the form of solid crystals due to the use of a saturated solution in treatment. Creosote oil may have a considerable reserve supply stored in the oil itself, this supply being fed to the wood as it is needed.

THE NON-PRESSURE TREATMENTS

The greatest single commercial use of non-pressure processes is in the butt treatment of cedar poles. The most important problem in this connection, both to the plant operators and to the consumers of butt-treated poles, is how to secure not only a uniform penetration of oil throughout the treated portion of each pole, but also to produce a uniformity of treatment of the different poles in a charge. Experience has demonstrated that some cedar poles are much more receptive to treatment than others and that in many instances one side of the pole will receive the treatment more readily than the other side. The extent of seasoning and the condition commonly termed as "case hardening" bear directly on these variations.

Sections of six so-called "case hardened" poles and of five poles not considered case hardened were very carefully tested and examined at the Forest Products Laboratory, Madison, Wis. The results of this study indicated that the condition technically known in lumber seasoning as "case hardening" is not the same as the condition referred to by the same name in the pole treating industry. The "case hardened" pole sections all had a hard, glossy appearing surface, and usually one or more large checks extending deeply into the heart of the pole were present with practically no small checks.

It seems probable that too rapid seasoning is responsible for the "case hardening" in the poles. Rapid seasoning is a common cause of excessive checking in structural sized timbers, and tends to produce a few large, deep checks rather than many fine ones. Slow seasoning is conducive to less checking, and to the development of numerous small checks rather than a few large ones. It appears, therefore, that in general the "case hardened" poles or areas can be identified by the absence or lack of distribution of numerous small checks and the presence of a few large checks, and that until a practical method of overcoming the effect of "case hardening" on penetration of oil is developed a greater uniformity in treatment may be secured by classifying poles and treating only non-"case hardened" ones.

A series of experiments was made at the treating plant of the Page & Hill Company under the supervision of John D. Burnes. In these experiments sections of

cedar poles were soaked in water and in zinc chloride solutions to learn if this soaking would so affect the surface of the wood as to permit a more rapid penetration of the preservative. It was found that no advantage resulted from these treatments.

SUPPLEMENTARY

Ernest Bateman (Forest Products Laboratory) submitted a supplementary report of some experiments to determine the loss of evaporation of creosote oil in the course of open tank treatment as influenced by temperature, velocity of the wind, exposed surface of the liquid, etc.

THE PERFORATING PROCESS AND ITS MECHANICAL APPLICATION

Edmund M. Blake, production engineer, Charles R. McCormick & Co., San Francisco, Cal., gave an exposition and historical account of the development of the process of perforating timbers for treatment, which process was described in an article by O. P. M. Goss, consulting engineer, West Coast Lumbermen's Association, in the *Railway Maintenance Engineer* for April, 1917, page 121, while the dedication of the patent to the public by the Association of Creosoting Companies of the Pacific Coast after its purchase from Mr. Goss was reported in the *Railway Maintenance Engineer* for January, 1920, page 17.

Mr. Blake's paper showed that the earliest attempt at timber perforation dates back to the beginning of timber treating in 1837, but it was not until 1912 that any scientific work was done along this line in this country, the development work being carried on very largely on the West Coast owing to the fact that the resistance which Douglas fir offers to impregnation with preservatives makes it especially important from the standpoint of the Douglas fir producers that a process of this kind be perfected. The development of a method occupied the time of a considerable number of timber and timber treating engineers from 1912 until the present time, the later portion of this time being occupied very largely in the development of a machine for making the perforations. Following the construction of the first practical machine known as the Clark machine in 1915, the war served as a retardant for further development work and it was not until during the past year that any real progress was made in the construction of a machine of a type that would stand up under actual service conditions, the first one now being under construction for the St. Helens Creosoting Company, St. Helens, Ore., which company expects to treat over 100,000 Douglas fir cross ties by the Rueping process during 1920, the ties to be perforated by this machine.

Mr. Blake stated that it is erroneous to suppose that because the experiments on the perforating process have been largely conducted in the Pacific Northwest on Douglas fir the value of perforating is applicable only to that timber. Obviously it will apply as well to the heartwood of any kind of timber in which it is now impossible to secure satisfactory penetration of preservative oils. Furthermore, perforating is applicable as well to lumber for practically every use, except that in which it is subjected to loading in tension or shear, such as lumber for switch ties, sheathing, bulkheading, pontoons, marine railways, bracing, mining timbers, cross arms, sewer outfalls, culverts, etc.

Perforating can also be used on round tapering sticks, such as poles and piling, and studies have already been started on the design of machinery to accomplish this purpose with timbers of that shape. Its application to structural timbers for use in bridges and other struc-

tures, in which the beams are subjected to loading in tension or shear, can only be settled after thorough investigation of the effect of the perforating holes upon the tensile and shearing strength of the timber.

To summarize briefly, it is expected that perforating before treatment will accomplish the following results:

1. The control, reduction, or complete elimination of checking in green ties and timber if perforating is done promptly after cutting.
2. A reduction of the temperatures required to secure satisfactory impregnation.
3. A reduction of the time required to treat ties and timber in the retorts.
4. A complete and uniform penetration of the preservative to the depth of the perforations.
5. A reduction of not over 8 to 10 per cent in the strength of the timber in compression perpendicular to the grain.
6. A reduction of the loss in the strength and mechanical life of the treated unperforated ties or timber to a point which will balance the cost of treatment to the satisfaction of the demands of track maintenance engineers.

REPORT OF THE COMMITTEE ON PLANT OPERATION

The report of the Committee on Plant Operation dealt with mechanical devices other than locomotive cranes for the handling of treated material, and the locomotive crane, its uses and limitations. The first section was divided into seven main classes as follows:

- A—Stationary stiff-legged derrick with movable boom.
- B—Cable-ways.
- C—Stationary crane with electric hoist.
- D—Movable electric hoist—Gantry type.
- E—Movable electric hoist—Monorail type.
- F—Locomotive crane.
- G—Miscellaneous.

Except where otherwise specifically stated, the report dealt with the loading of open-top cars only.

Type A, whether hand or power operated, is too simple and well known to demand discussion. By its use ties handled in tram car lots may be loaded into open-top cars at present for about 1½ cents each.

Type B, the cable-way, is of only limited usefulness in this field.

Type C is a stationary steel framework erected transversely over the tram tracks and the standard-gage tracks at the loading platform. An I-beam at the top supports a traveling electric hoist capable of lifting a tramload of ties or other material. The hoist is operated by two laborers. Chains attached to the hoist are dropped down over and around the ties on the trams, forming a sling. The load is then raised clear of the tram and the hoist travels to position over the railroad car, lowers the load to clearing distance, and trips on the chain slings are loosened, allowing the load to drop into car. On a test 10 trams containing 433 7-in. by 9-in. by 8½-ft. ties were handled by two men in 1 hr. and 30 min., or 138 ties per man hour.

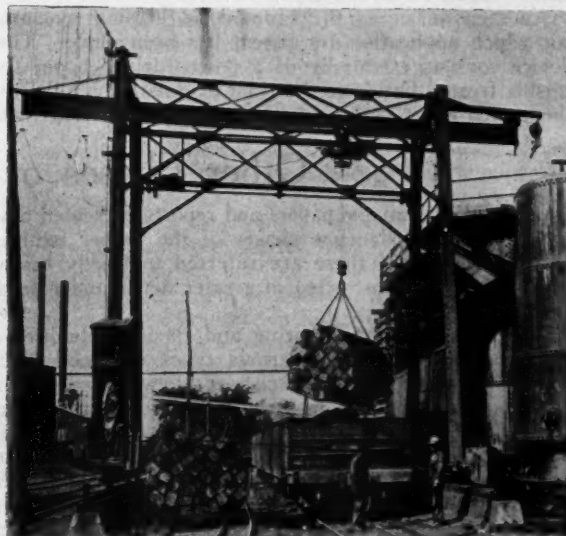
Type D is a gantry crane, or traveling steel framework, which supports the hoist, spanning two standard-gage tracks which may have a third rail for trams if needed. No loading platform is used. The hoist is operated from a cab at the ground level, the load being lifted vertically and transversely by the hoist, and longitudinally by the movement of the gantry to the desired position over the railroad car, which stands on the track not occupied by the trams. On a test by this method 10 trams containing 485 7-in. by 8-in. 8½ ft. ties were loaded into open-top cars in 50 min., or 194 ties per man hour.

Type E* consists of a steel framework erected longitudinally over the track and carrying a monorail from

which a traveling electric hoist and cab are suspended. On a test of this device 10 trams containing 645 6-in. by 8-in. by 8-ft. ties were handled at the rate of 276 ties per man hour.

Type F is the locomotive crane. Several types and a variety of makes are obtainable, and the details as to power, length of boom, weight, etc., may readily be varied to suit the requirements of most treating plants. The general preference is apparently for the 8-wheel M. C. B. truck type of crane, with a boom having an effective working radius of 10 to 35 ft. and a maximum lifting effort of 15 to 20 tons at the minimum radius. For handling treated cross ties with a locomotive crane, no better method is known to the committee than that practiced in a number of plants, whereby tramloads of ties are slung from the tram to their place in open-top standard-gage cars in chain or wire rope slings. This practice requires two or three men besides the crane man. On a test 18 trams containing 1,080 6-in. by 8-in. by 8-ft. ties were loaded into coal cars in 45 min., or 360 ties per man hour.

A variation of this use of the crane, as applied to loading stock cars, does away with the loading platform and with the manual lifting of the ties. In this method the stock cars are spaced at distances sufficient to admit of wooden platforms being placed across the tracks adjacent to the end doors of the cars. The crane swings a tramload of ties to the platform, from which point they



Gantry Crane at a Creosoting Plant

are pushed into the car through the end door by piece workers. In handling untreated ties with the locomotive crane, several specialized uses have been developed. One railroad whose tie supply originates along its own lines uses a log loader or truckless crane adapted to running on movable track sections on flat car decks. These flat cars, in turn, are each equipped with three sets of chains and log binders, so arranged as to secure three tiers of ties longitudinally to the car decks. A maximum of six laborers with this outfit can load twice as many ties per day as the average work train crew can load, working by hand only. For handling untreated and treated piling, poles and dimension timber, the locomotive crane is probably the most efficient and flexible instrument yet devised, the chain or wire rope sling, or the grab hook, either single or double, being the attaching devices most generally employed, depending on the

*This device was described in the *Railway Maintenance Engineer* for July, 1918; page 225.

character of the work or kind of material to be handled.

Type G is the Angier tie loader, a device of value in loading treated ties into closed cars, saving much of the heavy lifting incident to doing this work entirely by hand. It is operated by day laborers or piece workers, generally the latter, and effects a saving of about $\frac{1}{8}$ to



Loading Cars with the Angier Tie Loader

$\frac{1}{4}$ cent per tie on the piece work basis at the plants where used. This machine is patented, the patent being due to expire in the latter part of 1920.

Another device is the Hunter tie loading machine, for which application for patent has been made. This device consists essentially of a power driven boom for raising treated ties from the tram to skids, which deliver them to a short conveyor which in turn delivers them

over a boom into stock or box cars. The machine is mounted on narrow-gage trucks and is driven by a gasoline engine. Three helpers besides the machine runner are required. It is reported that the machine will handle 300 6-in. by 8-in. by 8-ft. ties per hour, or 75 ties per man hour.

The study of mechanical devices other than locomotive cranes for the handling of untreated material was confined to machines for the handling of railroad cross ties, the results being somewhat incomplete and unsatisfactory. The conclusions of the committee were that:

1. Where open-top cars are available, treated ties can be loaded at a great saving of labor and money if some type of crane is used. The locomotive crane has the advantage that it may be used about the plant for other purposes.
2. A locomotive crane is practically indispensable where heavy timbers, poles or piles are handled.
3. No perfected, satisfactory mechanical means have been found for loading into box cars.
4. Considerable work has been done in attempting to design some satisfactory machine for stacking and loading untreated ties, but so far no entirely successful machine has been made.

DISCUSSION

In answer to a question by C. M. Taylor (Port Reading Creosoting Plant) relative to the Hunter tie loading machine, A. R. Joyce (Joyce-Watkins Company) stated that it had met with considerable objection on the part of the men, who felt that it would put them out of their jobs. A. E. Larkin (Republic Creosoting Company) stated that there was considerable value in the possession of a mechanical tie loader even though it was not operated, since it served as an object lesson to the men. In the face of the potential competition it offered, the men were handling ties cheaper than could be done by the machine.

Other Phases of Timber Treatment

A NUMBER of the papers and reports presented covered miscellaneous phases of the timber treating art and several of these are referred to briefly below, while others are abstracted in greater detail under separate headings.

The Committee on Flooring and Paving submitted a report dealing with the various types of wood block paving used, the different classes of woods used for such purpose and the manner or methods of installation. This was followed by a report on Douglas fir wood blocks, including a set of specifications for the creosoting and method of laying this class of block. In the discussion which followed, E. M. Blake stated that the weather conditions of the locality where the wood block paving was used was an important factor in determining whether green timber or seasoned timber should be used for wood blocks. The discussion brought out that recent failures of wood block paving were not so much the result of defects in treatment as improper practice in laying.

A report on the purchase and preservation of treatable timber dealt mainly with the subject of car construction and presented a special study of the causes for repairs to wood freight equipment made during the month of July, 1919, at the shops of the Missouri, Kansas & Texas at Denison, Tex. The committee recommended the application of refined coal tar creosote oil conforming to the Railroad Administration Specification R 828 A be made either by spraying or by brush application to all points of contact between sills, posts, braces, etc., of freight car equipment; that these treatments should be applied only in the case of new construction when more efficient means are not available, such an application being more practical for repair work as con-

ducted under the present conditions; that wherever possible the preservative should be heated to 150 deg. F., but that during the summer a properly refined oil may be used without such heating; and that an application made in this manner with refined creosote oil is more economical and more effective than with other miscellaneous proprietary products now employed.

CLASSIFICATION OF POSITIONS IN TIMBER TREATING DEPARTMENTS

The Committee on Terminology presented an organization chart and definitions of the positions in an attempt to standardize as far as possible the titles of employees at timber treating plants. This chart is applicable to a large organization, and by eliminating some positions it is also applicable to a smaller organization. The definitions submitted were as follows:

Manager Timber Department. In charge of timber preservation, inspection, distribution of ties and timber, and conservation of forest products.

Supervisor Tie and Timber Inspection and Distribution. Reports to manager timber department and is in actual charge of tie and timber inspection and distribution.

Superintendent Timber Preserving Plant. Reports to manager timber department and is in actual charge of the timber preserving plant.

Chief Lumber Inspector. Reports to supervisor tie and timber inspection and distribution and is in actual charge of lumber and timber inspection.

Chief Tie Inspector. Reports to supervisor tie and timber inspection and distribution and is in charge of tie and switch tie inspection.

Chief Treating Engineer. Reports to superintendent timber preserving plant and is in charge of treating engineers, firemen, mechanics, and the general mechanical upkeep of the timber preserving plant.

Treating Engineers. Report to chief treating engineer and

handle equipment during process of timber treatment, making necessary run calculations.

Assistant Treating Engineer. Reports to treating engineer, being an apprentice to him.

General Foreman. Reports to superintendent timber preserving plant and is in charge of all outside labor connected with the handling and transportation of material in the yard.

Chemist. Reports to superintendent timber preserving plant, checks the treatment of material, makes all necessary analysis and does research for the advancement of the industry in general.

Chief Clerk. Reports to officer in whose office he is located and has charge of all office work in connection with that office.

The report indicated that a great variety of titles are used to designate an official or employee doing approximately the same work; in other words, the title does not give a definite description of the duties or responsibilities. It is apparent, particularly in regard to railroad owned plants, that not enough consideration is given the salaries of the men in charge of this important work. It is also noted with respect to the plant employees that there is a great variation in rates for positions implying approximately the same duties.

The committee recommended that the titles of employees be brought to a standard insofar as possible so that the title of a position defines the duties and responsibilities more clearly; that the importance of the industry be brought to official and public attention insofar as possible with a view of increasing the compensation of the men in charge of the work and continuing the interest of competent men in the industry; and that inasmuch as timber preservation is primarily an engineering problem, that it should be included in the engineering department.

REPORTS ON BRIDGE FLOOR FIRES

The report of the Committee on Service Tests of Flooring and Paving was confined as to discussion of the causes of fires in bridge floors of creosoted timber at Detroit, Mich., Kansas City, Mo., and Portland, Ore.

The roadway of the Belle Isle bridge across the Detroit river, which was destroyed by fire in 1915, was floored with 3½-in. deep creosoted wood blocks laid on a creosoted substructure. The accepted theory of the origin of the fire was that a strong wind carried sparks from a municipal asphalt repair wagon to the dry untreated and partially decayed sidewalk timbers, which broke into flames, igniting the creosoted substructure of the roadway. The heat developed was very intense and the collapse of the roadway timbers was accompanied by a collapse of a large portion of the steel spans.

The Missouri river bridge, which caught fire in August, 1919, consisted of a creosoted plank roadway laid on creosoted track ties and supported by steel girders. The fire was caused by sparks from a locomotive on a railroad which crosses under the bridge, the sparks setting fire to a large nest of straw, which in turn started a heavy fire on the creosoted ties and planks. No damage was done except surface charring of the timbers, caused by the burning of the creosote.

The bridge at Portland, Ore., consisted of a double-deck structure, the lower deck being used for railway traffic, while the upper deck was for street car traffic, vehicles and pedestrians. The floor system of the upper deck was composed of 4-in. Douglas fir creosoted blocks laid on creosoted planks and ties of the same material. The fire was supposed to have been caused by sparks from locomotives on the lower deck igniting dry untreated timber located in the bottom chord of the lift span, from which point the fire spread very rapidly, completely destroying the entire upper deck for a length of approximately 430 ft.

It is interesting to note that in all three cases the fire

was not caused by the direct ignition of the creosoted timber itself, but by the communication of the flames from other sources, such as untreated timber or straw.

REPORT ON THE LONG WHARF AT OAKLAND, CAL

One of the most voluminous reports presented at the convention was that of the sub-committee assigned to report on the long service of piles in the Southern Pacific dock known as the Long Wharf at Oakland, Cal. These were creosoted Douglas fir piles that were subjected to water infested with marine borers for a period of from 21 to 29 years. These piles and the conditions to which they were subjected were described in an article in the *Railway Maintenance Engineer* for August, 1919, page 278.

In discussing the report of the sub-committee, Dr. Herman von Schrenk, consulting timber engineer, offered a tribute to the pioneers in the art of timber treatment who were responsible for the long service records, such as that obtained on Long Wharf, that are now being brought to light. He also went into some detail to explain the circumstances under which the early work in timber preservation was carried on, pointing out the obstacles and lack of information under which the pioneers carried on their treating process. He referred at some length to other investigations of the Long Wharf service record, which are being made to insure that no facts in connection with this record may be overlooked. He said it was the desire of the committee to proceed with extreme caution in order that no wrong conclusion might be drawn from this remarkable record.

DEPTH OF PENETRATION

The penetration of creosote in various sizes of sawed lumber and round piling was described in a paper by R. H. Rawson, consulting timber engineer, Portland, Ore. In order to get at the fundamentals of the question, Mr. Rawson co-ordinated the data that he had collected on the subject and put these in such shape that some definite idea might be obtained relative to the depth of penetration of creosote in different sizes of material. The theory on which he worked was that the wood contains a certain volume of cavities, or open spaces, which can be filled with preservatives. Once the values for the voids have been determined, the amount of creosote required to fill the wood to a certain depth can be readily computed.

OTHER BUSINESS

The annual dinner of the association took place at the Hotel Sherman on Wednesday evening, about 150 attending. The principal feature of this dinner was an address by Samuel O. Dunn, editor of the *Railway Age*, who discussed the railroad problem.

The election of officers at the closing session on February 12, resulted in the selection of the following for the ensuing year: President, A. R. Joyce, Joyce-Watkins Company, Chicago; first vice-president, C. M. Taylor, superintendent, Port Reading Creosoting Plant (P. & R.-C. R. R. of N. J.), Port Reading, N. J.; second vice-president, V. K. Hendricks, assistant chief engineer, St. Louis-San Francisco, St. Louis, Mo.; secretary-treasurer, F. J. Angier, superintendent, timber preservation, Baltimore & Ohio, Baltimore, Md.; members executive committee, John Foley, forester, Pennsylvania Railroad, Philadelphia, Pa., and W. H. Grady, general superintendent, American Creosoting Company, Louisville, Ky. San Francisco, Cal., was selected as the place for the next annual meeting.

ADMINISTRATION REPORTS ON MAINTENANCE

Annual Reviews by Regional Directors and Others Give Estimate of Present Conditions

WITH THE END of government control now at hand it is of interest and unquestioned importance to consider the condition of the railway properties as of this important date. Some light on this and the Railroad Administration's efforts to maintain the properties during the past year will be learned from a study of those portions of the annual reports of the regional directors which refer to the maintenance of way. Two of the reports, namely, those of the Eastern and the Central Western regions, refer to this phase of the work in some detail; the others are rather brief. Unfortunately, the statistics in these reports are only carried to November 1, 1919, so that the results of the last four months are not covered definitely. However, as these are the months of least activity in maintenance of way the deficiency is not so marked.

REPORT OF THE DIVISION OF PURCHASES

The preliminary abstract of the annual report of Henry B. Spencer, director of the Division of Purchases for the year 1919, while by no means complete, gives some interesting facts concerning items of materials required by the maintenance of way department. Thus it is stated that during 1919 the value of rails bought by the Railroad Administration for the railroads amounted to \$60,764,970 and of cross ties \$108,232,363. This report also states that a saving of \$19,000,000 was made by the transfer to other roads of materials from roads having excessive stocks. Scrap materials to the value of \$47,000,000 were disposed of during the 10 months ending November 1, 1919. The following statement taken from the report presents some interesting facts relative to ties:

"The distribution of the supply has involved the transfer of 21,978,556 ties from one region to another during the 10 months. In sympathy with the increase in price of all grades of lumber the prices of cross ties advanced during the year from an average of 65 cents each to an average of 80 cents each, an increase of 23 per cent. The control of the inspection by this division, resulting in a uniform application of the standard specifications for all ties produced, has materially improved the quality of the ties received, so that the increase in the price paid for the ties has been partially compensated for in the better grade of ties which have been obtained. The stocks on hand have gradually increased during the year and on November 1 there were about 14,600,000 more ties available than at the beginning of the year, which is fairly good evidence that the current necessities have been well cared for."

EASTERN REGION

For the first 10 months of this year the total ties provided along the right-of-way of roads in the Eastern region amounted to 7,620,721, as compared with 2,838,396 for the same period in 1918. Fir ties were shipped into the Eastern region by boat and by rail to the extent of approximately 1,250,000. The total ties reported received by all federal managers from all sources during the first 10 months (including approximately 90,000 fir ties received after November 1), amounted to 15,360,000. By deducting from this total the ties produced locally and the fir ties received, we obtain 6,500,000 as the approximate number of ties received from outside regions, ex-

clusive of 1,250,000 fir ties above referred to.

The total tie requirements for maintenance in this region, as originally recommended by the federal managers, was 19,500,000. The average number of ties used in maintenance during the test period was 17,098,689. The total number used in 1918 was 14,222,995, leaving a shortage of 2,875,694, which, added to the test period average, gives a total of 19,974,383 as the necessary number of ties to be placed in 1919 in order that the average number of ties placed in the two years of federal control would equal the average of the test period.

There were 12,630,000 ties on hand on January 1, 1918. This number, added to the requirements for 1919, which we will consider as 19,500,000, makes a total of 32,130,000. Up to November 1 the total number of ties used in maintenance was 12,520,000. It is estimated that 1,400,000 were used during the last two months of 1919. There has been placed in construction approximately 1,000,000, which will make a total of 14,920,000 for the year 1919.

Ties on hand, January 1, 1919.....	6,956,067
Ties received to November 1, 1919.....	15,280,000
Estimated receipts in November and December:	
Fir ties.....	90,000
Local production.....	1,000,000
From other regions.....	500,000
	1,590,000
Total receipts for 1919.....	16,870,000
Total supply for 1919.....	23,826,000
Probable number used for all purposes in 1919.....	14,920,000
Probable number on hand, January 1, 1920.....	8,900,000
Required number for maintenance in 1919.....	19,500,000
Number used in maintenance in 1919.....	13,920,000
Apparent shortage in maintenance.....	5,580,000
Ties on hand, January 1, 1918.....	12,630,000
Ties on hand, January 1, 1920.....	8,900,000
Shortage in stock on hand.....	3,730,000
Total shortage (maintenance and stock).....	9,310,000

Throughout the entire season an earnest effort has been made to have ties from outside regions shipped to those roads in the region in most need of them. The local tie production on the New England roads made up nearly 50 per cent of the total local tie production. Therefore very few ties from outside of the region have been shipped to New England roads, as it was thought best to distribute the surplus tie production in the New England territory to those roads within the same territory where the local production was insufficient to take care of requirements.

A very large percentage of the ties received from outside regions required treatment before being used. Therefore it has not always been possible to supply a sufficient number of "U" ties to roads short of ties, while a shortage of creosote oil and the number of seasoned ties fit for treatment has made it impracticable to distribute treated ties to roads not heretofore using such ties. Furthermore, the use of treated sap pine ties as well as the fir ties from the Pacific coast required the use of tie plates in order to get good service from the ties, and in many cases it has been found impracticable to distribute such ties on account of the unwillingness of the corporations to finance the addition and betterment charges in connection with the installation of tie plates.

Rail

During the last two months of 1918 the rail mills started to roll the rail which had not been delivered on

back orders, and as a result, on January 1 there was a fairly good tonnage of rail on hand, namely, 113,000 tons. Since January 1 an additional tonnage of 160,000 tons has been delivered to the roads in the region on these back orders, making a total tonnage of rail furnished on back orders of the corporations of 273,000 tons. In addition to the above, the administration ordered and had 40,000 tons rolled during the early months of the summer. Thus the total rail available for all purposes up to November 1 was 313,000 tons. There had been laid in maintenance up to November 1 approximately 251,000 tons (158,000 tons of which was laid prior to June 1). In construction approximately 12,000 tons was laid, while 50,000 tons was on hand on that date.

The rail situation on January 1, 1920, was about as follows:

The average amount of rail used in maintenance during the test period was 307,000 tons. The amount laid in 1918 was 275,000 tons. The administration's obligations for 1919, as measured by the test period average, was 339,000 tons. The amount laid in maintenance in 1919 was 271,000 tons. The shortage for the two years, as measured by the test period average, is 68,000 tons. The amount of rail on hand January 1, 1918, was 94,000 tons. The probable amount on hand January 1, 1920, was 40,000 tons, so the shortage in stock on hand was 54,000 tons.

Ballast

The amount of ballast used in 1918 fell off approximately 15 per cent as compared with the test period, while during the past year there has been a further reduction in the amount of ballast used, the total amount placed amounting to less than 70 per cent of the test period average. This reduction was largely due to the inability of the corporations to undertake the financing at that time of new ballast work where part of the expense was chargeable to capital account. As a result the normal ballast program had to be materially reduced, and in the majority of cases confined to such ballast work as was entirely chargeable to maintenance.

General

Speaking in general and with the exception of the shortage in the amount of major materials used, the roads in the region as a whole have been reasonably well maintained. In some instances a marked shortage of labor has made it very difficult to carry out the maintenance of program as made out in accordance with the requirements and as measured by the test period expenditures. Where roads had apparently over-expended in 1918 as measured by the test period expenditures, properly equated for increased prices of labor and material, every possible effort has been made to reduce the expenditures during the latter part of the year to the actual necessity from the standpoint of safety in operation in order that the total expenditure for the two-year period may not materially exceed the equated allowable expenditure as measured by the test period average.

On the other hand, where roads under-expended in 1918 and a marked increase in the maintenance budget was necessary this year in order to get them back in as good condition at the end of the year as of January 1, 1918, no reductions have been made and every effort possible has been made to carry out the necessary work. In most cases results have been reasonably satisfactory except where the shortage in tie supply, rail requirements or other conditions over which we have had no control have made it impossible to apply the necessary materials.

Some few roads in the region will somewhat exceed the equated allowable expenditure for the two years of federal control as measured by the test period average,

due in some instances to the necessity of making expenditures for safety and to provide for contingencies of increased traffic, also unavoidable in some instances owing to programs having been inaugurated by the corporations or receivers for general improvement of the properties, which programs could not be suspended. On the other hand, some few will somewhat under-expend. As a whole, however, the actual expenditures will very nearly balance the equated allowable expenditures.

The maintenance budgets for all the roads, based on the actual expenditure for the first 18 months of federal control and the estimated expenditure for the last 6 months, show a total probable over-expenditure of approximately \$12,500,000, and a probable under-expenditure of approximately \$9,300,000, thus making a net over-expenditure of approximately \$3,200,000. There is included in this an over-expenditure of above \$2,700,000 on account of the removal of snow, ice and sand in the period of federal control as compared with the test period. Analysis of the maintenance budgets also indicates that there will be an allowance of about \$1,400,000 due to increased property, making a total of \$4,100,000, to offset the over-expenditure of \$3,200,000.

ALLEGHENY REGION

Way and structures have been well maintained, except that ties and rails have not been available to permit normal renewals on some of the important roads. The expenditures to September 30, 1919, increased 17.3 per cent over the same period in 1918, due to increased rates of pay and the cost price of materials. The man hours to October 31 decreased 23 per cent as compared with the same period in 1918, due to a reduction in hours worked per day. In the installation of major materials, about the same tonnage of steel rail was used this year as last year; the number of cross-ties used this year in renewals increased 21 per cent compared with 1918.

NORTHWESTERN REGION

It was necessary to regulate the maintenance of way work in such a manner that the obligation of the government under its contract with the railroads would not be exceeded, except where additional work would be required as a matter of safety. Budgets were accordingly prepared at the beginning of the season, based upon the relative quantities of labor and material, together with the monthly expenditures required to carry out the work, which were limited to these budgets. The maintenance of the properties has been watched very closely, and the same policies as were practiced prior to federal control were continued, resulting in the maintenance of the properties in about the same condition as they were maintained by the railroads. The authorized program for 1919 called for an expenditure under maintenance of way and structures of \$113,129,889.

CENTRAL WESTERN REGION

In general, maintenance of way work in 1919 progressed with greater expedition than in 1918, due to a better supply of labor in the earlier months. This was true particularly in the southwestern portion of the region. The exceptions to this were in certain limited areas usually supplied through Mexican ports of entry.

Supplies of ties were generally good and sufficient to enable an early start to be made on most lines, but in the case of the Alton, the Wabash and the Rock Island some shortage later was manifest. This was largely corrected finally, but has prevented the full year's program being carried out.

The supply of rail has been less favorable except on lines that had provided for their needs prior to the current year. This is true with the Rock Island, the El

Paso & Southwestern, the Wabash, and the Santa Fe. It is expected, however, that most of the available rail will have been laid by the end of the year.

The use of ballast has not been quite so extensive, in some instances because of the difficulty of getting a large output from commercial plants, shortages in equipment, and a less extensive program for capital improvements involving maintenance expenditures.

In bridges and culverts the quantity of work has been less of permanent character, due to a modified program for additions and betterments, resulting in more repairs and renewals of structures in kind. With the other miscellaneous structures there has been about the normal quantity of work done. The railroads generally have been well maintained, and in some instances the shortage of a normal program in 1918 has been overcome in 1919, while in a few instances the apparent over-expenditures of 1918 have been overcome in 1919. A special effort has been made to confine the work of maintenance of way to the prescribed hours of service and to avoid the expenditures of overtime, resulting in a marked reduction of overtime and its ratio to total expenditures.

To the end of October, 77 per cent of the total tie requirements had been inserted, compared with 79 per cent for the same period in 1918. However, by comparing the actual number of ties inserted in 1918 with that of 1919, it is found that there is an increase of 4.4 per cent for the 10-month period of 1919 over the same period of 1918.

To the end of October 62 per cent of the total estimated rail program had been laid and 23 per cent of it is available for placing in track, leaving a shortage of 15 per cent for the contemplated year's work. During the first 10 months of 1918, 72 per cent of the total amount of rail for the year was laid. Taking into consideration, however, the actual tonnage placed in track for this period, it will be noted that there is an increase of 54.2 per cent for 1919 over 1918.

During the period from January 1 to November 1, 1918, 81.5 per cent of the maintenance expenditures for the entire year were made, and during the same period for 1919, 83.5 per cent of the estimated maintenance expenditures for the year had been made.

The Tie Situation

Briefly, the tie situation in the Central Western region is represented by the data shown below, which are, in round figures:

	Ties
On hand January 1, 1919.....	9,000,000
Received from other roads.....	8,000,000
Produced on right-of-way, own lines.....	6,000,000
Total	23,000,000
Total supply.....	23,000,000
Inserted during first 10 months of year.....	13,000,000
Balance on hand available for immediate use.....	10,000,000
In transit or at plants being seasoned for treatment.....	3,000,000
Total	13,000,000

The tie program for 1919 contemplated the use of 19,000,000 ties for renewal and construction, and during the first 10 months of the year we have inserted only approximately 13,000,000, making the program 6,000,000 ties short of what was estimated, and which in a measure accounts for the number of ties on hand as of November 1.

THE SOUTHWESTERN REGION

Due to the comparatively small amount of new steel rail rolled, it has not been possible to carry out the desired program of rail renewals and replacements, but repair rail has been used to the best advantage and main

line tracks are in good condition. While branch line tracks and sidings have been maintained in a condition safe for operation, additional rail could have been used to advantage on some railroads had it been available.

Bridges, buildings and other structures are in good condition. The roadway has been properly maintained, although a large amount of work has been required and a considerably increased expenditure made necessary by the excessive rainfall throughout the Southwest, not only in the spring of this year, but particularly during the fall and winter months.

A NEW CLASSIFICATION OF TECHNICAL MEN

ENGINEERING COUNCIL recently received a report from its committee on Classification and Compensation for Engineers which comprises a scheme of standardizing engineering positions and includes suggested minimum rates of compensation for different grades of positions. Owing to the fact that an attempt was made to adopt a classification that would apply to all branches of engineering, the application of the classification to the railway technical departments is of limited value. The classification with the minimum experience requirements for the various grades is as follows:

	Experience in years	
	With degree	Without degree
Professional service		
Grade 1—Chief engineer.....	12	16
Grade 2—Engineer.....	8	12
Grade 3—Senior assistant engineer.....	5	9
Grade 4—Assistant engineer.....	2	6
Grade 5—Junior assistant engineer.....	0	4
Sub-professional service		
Grade 6—Senior aid, office.....	0	5
Grade 6—Senior aid, field.....	0	5
Grade 7—Aid, office.....	0	2
Grade 7—Aid, field.....	0	2
Grade 8—Junior aid, office.....	0	0
Grade 8—Junior aid, field.....	0	0

The application of these classes to railway engineering is illustrated by the assignment of the following descriptive terms used in railroad parlance to these various classes:

1. Chief Engineer—chief engineer of maintenance of way.
2. Engineer—electrical engineer, mechanical engineer, bridge engineer, tunnel engineer, maintenance of way engineer, signal engineer, division engineer, district engineer, structural engineer, valuation engineer, designing engineer, etc.
3. Senior Assistant Engineer—senior assistant electrical engineer, senior assistant mechanical engineer, senior assistant bridge engineer, etc.
4. Assistant Engineer—similar to senior assistant engineer.
5. Junior Assistant Engineer—engineer inspector, etc.
6. Senior Aid—chief draftsman, chief computer and chief inspector.
7. Aid—draftsman, computer, instrumentman and inspector.
8. Junior Aid—junior draftsman, tracer, rodman and tapeman.

The committee also prepared a schedule of minimum salaries for the positions in these various grades, but this was submitted as a suggestion for study rather than for adoption.

SCHEDULE OF SALARIES SUGGESTED FOR DISCUSSION

Grade	Total Experience years to qualify		Salary Range	
	with professional Degree	without professional Degree	Minimum	Maximum
8—Junior aid	0	0	\$1,080	\$1,560
7—Aid	2	2	1,680	2,400
6—Senior aid	5	5	2,520	3,240
5—Junior assistant engineer...	0	4	1,620	2,580
4—Assistant engineer	2	6	2,700	4,140
3—Senior assistant engineer...	5	9	4,320	5,760
2—Engineer	8	12	5,940	No limit
1—Chief engineer	12	16	8,100	No limit



Compressor Car Set Off Beside the Track.

SOME NOTES ON THE PNEUMATIC TIE TAMPER

Character of Track Organization and Methods of Operation
That Are Found to Secure the Best Methods

BY W. H. ARMSTRONG,

Manager, Tie Tamping Department, Ingersoll-Rand Company, New York City

SINCE ITS introduction in 1913, the pneumatic tie tamper has met with such an interested reception by railway men that the device and its performance are familiar to nearly everyone concerned with railway track maintenance. The first road to undertake the use of this equipment now has 228 of the Ingersoll-Rand tie tamper outfits in use, while in the country at large some 60 steam roads are now using 4,000 tie tampers for which they are operating about 600 of the compressor car units. The nature of the tie tamper and its advantages in track maintenance have been dwelt upon repeatedly in the pages of the *Railway Maintenance Engineer* so that its possibilities and performance records have been rather fully covered. However, not a great deal has been published with regard to the details of the method of operation, and with the wealth of experience which has been accumulated with the widespread use of this tool, certain basic facts are now available which will be of considerable value to those who are using or contemplate the use of this valuable substitute for manual labor on the railroad.

To make this exposition thoroughly intelligible to those who are not familiar with the tamping equipment, a brief description of the tool and compressor plant is given by way of introduction. The tamping tool consists of a percussion hammer arranged with two handles and fitted with a tamping bar which is dressed on the face the same as the hand-tamping pick or bar. It is equipped with a retainer for holding the tamping bar in the machine so that it will not drop out when being lifted from one position to another. The handles are arranged to be held in the hands of the operator so that the machine balances naturally in the correct position for tamping ties. To meet conditions imposed by different kinds of ballast, three different sizes of tamping bars are furnished.

In terminals, tunnels and other places on the railroad where pneumatic signal lines are installed, or where permanent air lines are available, the tie tampers can be operated from these lines without the necessity of the auxiliary compressor unit. To obviate any danger of the

tampers using so much air as to make the signals inoperative a special valve is provided which cuts off the air from the machine when the pressure drops to the minimum required for safety.

For supplying air at points where a permanent source of air supply is not provided, a portable gasoline-driven compressor unit has been developed, which is mounted on a suitable car and is self-propelled so that it will run under its own power to the place where work is to be performed and there set off to one side of the track. This portable compressor is made in two sizes, one for operating two tampers and the other for operating four tampers. Tie tampers will work under any air pressure of from 60 lb. to 100 lb., but the best results are obtained with an average working pressure of 65 lb. except when they are used for picking concrete; for this work 75 to 80 lb. pressure will give the best results.

PROPER METHODS ESSENTIAL TO IDEAL TAMPING

The tie tampers should be worked in pairs, one on each side of the tie and opposite each other. They should be held perfectly vertical when starting, with the broad face of the bar against the tie until the face reaches the bottom of the tie. Then both tampers should be swung back at the same time until they are at the proper angle to drive the ballast under the center of the tie. The tampers should be started under the rail and worked to the end of the tie, then lifted back under the rail and worked to about 8 or 12 in. inside the rail. The men should not be allowed to stay too long on one tie, as they will over-tamp and hump the track. The average should be about two minutes to a tie, and that is divided, one minute outside of the rail and one minute inside.

If the tie is loose so that it pumps up and down under traffic or if the track is lifted out of face, it is not necessary to rake the ballast out from between the ties, as the tamping bar will work through the ballast. If track is being tamped in face or the tie is fairly solid under traffic, it is desirable to loosen up the ballast with a pick before

tamping, and, in some cases, to rake out a little of the ballast, as this enables more speed to be made in tamping.

A workman should not grip the handles tight or ride on the tampers as it has enough weight so that it will feed itself down. Gripping tight on the handles, throwing the weight on, or riding upon the tool only tends to make it harder on the man and slows up the speed.

When tamping through slip switches or around frogs where the space is contracted, the tamping bar should be inserted through the space with the broad face parallel to the rail and the machine held in a vertical position. After running a few seconds it will displace a sufficient amount of the ballast to permit swinging the tamping bar around so that the broad side parallels the cross tie. One then proceeds just the same as in open work, that is, holding the machine in a vertical position until the tamping bar reaches the bottom of the tie, then swinging back at the proper angle to pack the ballast to under the tie.

USE OF THE COMPRESSOR CAR

The compressor car is placed on the track on the flanged wheels and run under its own power to the point where the tamping is to be done, being protected in transit in the usual method by train order or by flags. It is then removed from the track to a permanent car rest erected on the side of the right of way or to a temporary car rest made of a crib of ties, being rolled sidewise on a transverse truck to the crib on the cross rails which are provided as part of the compressor equipment. This can be done very quickly, as with the two-tool compressor, four men can easily lift one end at a time to insert the cross rails, while with the four-tool outfit suitable lifting jacks are provided for that purpose. After the car is placed on the car rest the hose lines are run out from the compressor and connected to the tampers and as these hose lines are 300 ft. long it is possible to tamp 300 ft. either way from the compressor, or 600 ft. of track so that at most it will only be necessary to make one move during a day. At the end of the day the plant can be locked up and left on the right of way, or, if preferred, it can be used to carry the crew in to section headquarters.

The two-tool outfit is recommended where it is to be used strictly as section equipment and assigned to individual sections or on single track roads where the maintenance gang is composed of not more than six men. With the two-tool outfit it is satisfactory to assign one man permanently to look after the compressor car, although it is not absolutely necessary, as in most cases the compressor can be looked after by the section foreman.

The four-tool outfit is recommended where it is to be assigned alternately to more than one section or to ballasting or floating gangs that will handle it continuously in general reballasting or resurfacing, and leave the subsequent maintenance to the section gang.

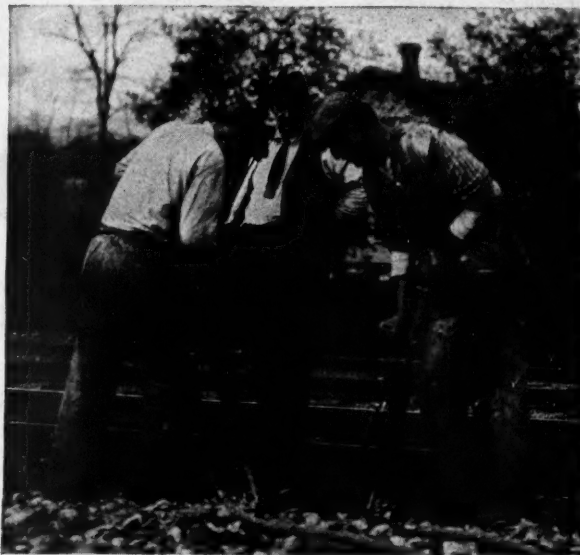
ORGANIZATION OF THE TAMPING GANGS

The character of the organizations developed for pneumatic tamping may be illustrated by describing that of the New York Central, Lines East of Buffalo, which have adopted the two-tool outfit, and that of the Delaware, Lackawanna & Western, which has adopted the four-tool outfit.

On the New York Central, which has standardized the two-tamper outfits, one of these is assigned permanently to a section. A section averages 12 to 15 miles of single track, that is, a double-track section is six miles long and a four-track section three miles, etc. An outfit is used on an average of 100 actual working days per season of 200 days, which leaves 100 days or one-half the total time for work other than tamping and track surfacing. This road considers the ideal size of a section gang working with a two-tamper outfit to be 6 men and

a foreman, as compared with 12 men and a foreman for a hand gang. This, however, varies with the importance of the section, the layout of the track and the density of the traffic. On account of the extreme shortage of labor the road has been forced to get along with smaller gangs and has been able to obtain satisfactory results which would be impossible without the machine.

On the Delaware, Lackawanna & Western one four-tamper outfit is assigned to two adjoining sections, with from three to four miles of two main tracks, or an average of seven miles of single main track per machine for a



Tie Tampers at Work on the Lackawanna

summer working period. This is on a basis of a four months' period being devoted to the tamping of ties, with the two section gangs, each raising half of its section per summer season, back filling it with new ballast, placing sufficient ties in the other half of each section to take care of conditions throughout the balance of the season and tamping them. Therefore, half of each section will be completely raised and re-ballasted, and the other half of each section re-tied from the yearly tie standpoint and carefully tamped so as to place the entire section in good working condition to pass through the balance of the year. This method guarantees the re-screening and renovating of the ballast on one-half of each section every third summer with the regular section force. The average section gang with machines consists of eight men and a foreman.

When one or more of the tie tamping outfits are in service on a railroad, some one person should be designated to follow up the compressor outfits to see that they are kept in continual service and that proper performance reports are sent in regularly. Several railroads that are using these machines have adopted report forms. This insures an accurate record of performances of the machines and the compiling of data to show a comparison of the machine and hand methods of doing the work. It is also well to designate some one man to look after the proper maintenance of the compressor units to see that they are in proper working condition at all times. It frequently happens that minor troubles will occur, such as adjustments of carbureters, timers, etc., which, if promptly and properly corrected, will insure against serious trouble. This duty is usually assigned to the mechanic who looks after the maintenance of the section motor cars or other machinery equipment used at pumping stations, etc.

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Maintenance of Way Brotherhood Delegates in Convention at Detroit Last September

STRIKE OF MAINTENANCE MEN CALLED OFF

Negotiations Between Brotherhoods and Administration
Lead to Plans for Arbitration

A STRIKE by the United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers, which was to take place on the morning of February 17, in case the Railroad Administration had not complied by February 14 with its demands for a general increase in wages, was indefinitely postponed on the night of February 14. This action was taken after President Wilson had proposed a plan for a new general investigation of the wage demands of the railroad labor organizations by a tribunal which will function after the return of the railroads to private management. The proposal was tentatively accepted by the executives of the 14 other organizations on whose wage demands Director General Hines and the President had declined to render a decision during the remaining period of federal control. It was not accepted by the maintenance of way brotherhood until after Director General Hines had telegraphed A. E. Barker, its president, that a strike would merely cause the loss of the brotherhood's status under its national agreement recently signed with the Railroad Administration, and after President Wilson had telegraphed a special request that it join with the other organizations in accepting his plan. This action was also recommended by the brotherhood's committee at Washington after having been subjected to considerable pressure from the other organizations.

The President's proposal to the labor organizations generally was that he would bring about the earliest practicable organization of any machinery provided by the pending railroad legislation for dealing with wage matters, or in the event that no such machinery were made by the law, to use his influence to get the railroad companies and the employees to agree on a special tribunal to settle the matter. He also promised to constitute a committee of experts to begin an immediate investigation of the entire problem for the purpose of expediting its solution and meanwhile he requested the maintenance of way brotherhood, the only one that had ordered a strike, to withdraw its order. The labor leaders replied to this, objecting to waiting for the creation of a tribunal by legislation but stating that they would submit to their constituencies at a meeting in Washington on February 23 a plan for the creation of a special joint commission, composed of an equal number of representatives of the employees and of the railroad companies. They asked that the President secure the agreement of the railway executives to such a plan and specified several other conditions not mentioned by

the President in his proposal, including one that a binding decision be handed down within 60 days after the agreement to establish the tribunal. Apparently, however, the President did not object to this interpretation of his proposal because in his telegram urging Mr. Barker to call off the strike he said that the response of the other organizations had indicated the purpose of the organizations generally to "conform to the principles" of his message. On February 16, Mr. Hines asked the Association of Railway Executives to appoint a committee to confer with the Railroad Administration officers on the wage question.

The demand of the organization of maintenance of way employees and shop laborers proposed that the rate for all mechanics in the maintenance of way department be increased from a basic rate of 53 cents an hour to a uniform rate of 68 cents an hour and that the rate for all trackmen and other laborers be increased from rates running from 28 cents to 40 cents an hour to a uniform rate throughout the United States of 50 cents an hour. The bulk of these employees, according to a statement in a report by Director General Hines to the President, now receive between 35 and 40 cents an hour.

These demands were presented last summer to the Board of Railroad Wages and Working Conditions and, after a hearing, were held in abeyance along with the other general wage demands, pending an effort on the part of the government to reduce the cost of living. They were again taken up recently and the officers of the maintenance of way brotherhood were invited by Director General Hines to a conference which began at Washington on February 3, at which Mr. Hines discussed the entire wage question with the officers of 15 railroad labor organizations. While these were pending President Barker of the brotherhood returned to his headquarters at Detroit and on February 9 announced a strike order, saying that Mr. Hines had shown no indications of an intention to comply with the demands. A committee of ten representatives of the brotherhood called on Mr. Hines and gave him official notice of the strike vote on February 11, just after his conferences with the other organizations had been brought to a conclusion and the entire matter had been referred to the President. Mr. Hines on February 13 gave the committee a reply in the form of a letter to President Barker in which he reviewed the entire matter as follows:

"The record on this matter is that your letter, dated December 4, urging speedy action was received on December 11

and was promptly taken up with the wage board. You were advised on December 23 that the board would report at an early date. On December 30 you called on me and again explained the importance of speedy action. On December 31 the members of the Wage board submitted their divergent reports on your and other important matters, necessitating in the divisions of Operation and Labor careful analysis and comparison which was expedited as much as possible and the need for expedition was repeatedly emphasized by my office. By January 23 it had become apparent to me that your matter and the others pending were related to each other in so many ways that they must be considered as a whole and with reference to the early termination of federal control. I therefore telegraphed you and other chief executives of principal organizations requesting a conference on February 3 to consider feasible methods for dealing with these subjects. Your organization proceeded, nevertheless, to hold a convention which took action before our conference had been concluded, and necessarily without the full information as to conditions which your organization would have had if it had deferred action until the conference was concluded. Your organization never even attempted to give notice that you would discontinue performing the work contemplated by your national agreement until February 11, the date your committee sought to see me, which was only six days before the strike was to become effective; and your strike order was not even announced through the newspapers until February 9 or 10.

"The national agreement clearly contemplates that your organization as such will continue to work thereunder in accordance with the hours and working conditions therein provided and in accordance with the wages specified in the director general's orders until a change of policy shall be adopted on not less than 30 days' notice. The government regards your strike order on less than 30 days' notice as a repudiation of the national agreement which your organization sought and assumed. This mistaken action, if not corrected, will be regarded as conclusive evidence of the complete failure of the principle of collective bargaining on the part of your organization.

"The strike, of course, will automatically terminate your national agreement and thereby you will completely destroy the status which you so earnestly sought such a short time ago, and at the expiration of federal control your organization will have no recognized and established working conditions, thus putting the railroad corporations in the best possible position to claim that there is no basis whatever for them to recognize or deal with your organization or to respect any working conditions or other advantages which you may have secured under this agreement. I believed that this national agreement constituted a great forward step for your organization and improved your status to a much greater relative extent than was the case of any other organization. I am, therefore, wholly unable to understand the policy which now proposes to end this valuable status on February 17 without the faintest hope of its being revived.

"As a result of the extended and enlightening sessions of the conference with the chief executives, their views and mine have been submitted to the President. He has taken the position that on account of the generality of the demands which are being pressed by practically every class of railroad labor they cannot be handled to a conclusion by the Railroad Administration prior to March 1 but must be handled by an agency which can continue to function after that date. He has indicated his purpose to bring about at once the creation of machinery to deal with these matters effectively and expeditiously and his purpose to carry out fully and promptly the promise he made to railroad employees last summer that if their general wage adjustments could not be acted upon prior to the end of federal control, he, nevertheless, would continue to use the full influence of the executive to see that justice was done them. He has indicated that he proposes to proceed on the policy that six months now having elapsed, the matters ought to be taken up and disposed of on their merits at the earliest practicable time, while pointing out that it is a physical impossibility to do this by March 1. He has specifically requested that any labor organization which has issued a strike order withdraw such order immediately and await the orderly solution of this question, and has pointed out that any other course will prove not only a grave injury to the public, of which railroad labor is such an important part, but a serious blow to the important principle of collective bargaining and will delay rather than expedite the just and prompt solution of the matters. He has also specifically requested that each of the organizations bring to the attention of all its members his message and the accompanying report of the director general, being confident that when the members personally un-

derstand they will see that the position of the government is both just and unalterable and adequately protective of the interest of the employees. I presume you will promptly see the full text of the President's message and of my report.

"In conclusion I specifically advise that for the preservation of your organization and its present status under its national agreement, as well as for the urgent public reasons expressed by the President, you at once take steps to prevent the carrying out of the strike order on next Tuesday. I ask you to make it perfectly clear to every member of your convention that if at this stage the strike takes place it will be a strike solely because your organization is unwilling to co-operate in the procedure proposed by the President of the United States. The government cannot possibly recede from its position, so that the strike offers no hope of accomplishment for your membership and promises merely the loss of your existing status, and will merely delay rather than expedite the just solution which the President is seeking, and in which he asks your support. I take it you cannot refuse to comply with his request that his message and my report be sent to your individual members for their consideration, and meanwhile it would seem to be out of the question for you to commit that membership to a strike fraught with so much disadvantage to it without the possibility of any advantage whatever. I feel that on account of the undoubted pressure from your membership your convention has been driven into a position which it would not have taken if it had first considered the full explanation of the inevitable and unalterable position of the government as explained in the President's statement and in my report to him, and that in the light of these new developments you will be enabled to modify your action and thus protect your interests and avoid getting into a false and untenable position which can never be sustained or justified."

On the following day Mr. Hines also telegraphed the letter to Mr. Barker, saying in addition:

"I believe it will be helpful for me to repeat to you by wire the letter which I addressed to you yesterday and delivered to Mr. Malloy. I earnestly hope that for the purpose of promoting the best possible understanding between the government and the delegates of your convention and for the purpose of preserving conditions which I believe are of the highest importance to your organization you will ask your delegates to give the most careful thought to what I have written and to realize that my letter was written in a spirit of the utmost friendliness and with a sincere desire to promote the interest of your organizations as well as for the purpose of discharging my solemn duty to the public. A message from the President to you and the heads of other organizations is to be released during the day and will be telegraphed to you as soon as practicable."

President Wilson also telegraphed to Mr. Barker on February 14 as follows:

"Yesterday I addressed to the chief executives of the principal railroad labor organizations, including the one of which you are president, a message, a copy of which has been transmitted to you at Detroit. I have just received a response indicating the purpose of the organizations generally to conform to the principles of my message, to bring it to the attention of the membership and to hold a convention here on February 23 for the purpose of carrying the matter into effect. I note with surprise and disappointment that your organization is the only one addressed which has not expressed its concurrence in this method of handling the matter, and I understand that no advice has yet been received of withdrawal of your strike order which was sent out several days ago.

"The director-general of railroads explained this situation to your committee as soon as it presented to him advice of the strike order, and he has since summarized the position of the government in a telegram to you, which I fully endorse. I ask you to take at once the necessary steps to withdraw the strike order and to make sure that no interruption whatever to transportation occurs on that account in this critical period.

"I feel sure that you and your associates upon full consideration will realize that you cannot in justice to your membership and the citizens generally of the United States persist in a course which is opposed to your obvious duty to the country, to the direct and specific request of the government and also to the attitude of all other railroad labor organizations, all for the mere purpose of objecting to the procedure I have proposed, which is the only practicable method of obtaining a prompt and reasonable settlement of the important wage questions now pending. I also ask you to send my message and its inclosure to all your members and give them the opportunity of co-operating with all the rest of railroad labor in handling the matter."

On the same date Mr. Barker notified Mr. Hines that the order had been postponed, in a telegram reading as follows:

"In compliance with recommendations of the committee of the brotherhood now at Washington I am indefinitely postponing the strike order which was to have become effective Tuesday morning, February 17. However, I am confirmed in my belief that strike action would have been eminently justified to force favorable action on the wage demands of the men for whom I speak. It is evident our committee did not desire that the Maintenance of Way Brotherhood should be driven into a position seemingly forgetful of the public interest due to unfriendly interests, including the avenues of information by which the public can be reached, the people being ignorant of actual conditions among these railway workers. I desire to impress upon you with all the force at my command the absolute necessity of relief for our members immediately if a most serious situation from which there will be no retreat is to be avoided."

That the crisis has been merely postponed as a result of the action by the brotherhood is apparent from a statement made by President Barker on February 16:

"The strike certainly will take place if President Wilson does not quickly make good his promises to get speedy relief to our people."

Director General Hines, on February 12, submitted to the President a full report of his negotiations with the labor organizations generally, together with his recommendations and communications from the labor executives outlining their position, in which they insisted on the necessity of general wage increases to meet the increased cost of living and a decision before the expiration of federal control. The matter was referred to the President at their request and on February 13 the President personally conferred with a committee of three representing the labor organizations and handed them a prepared statement of his answer and his proposal for a new tribunal. He repeated his statement of last August that a temporary basis of living cost ought not to be made the occasion for a permanent wage increase, but in order that the consideration of wage matters might not be postponed indefinitely because of the return of the roads he promised to see that the claims of the organization should be properly and promptly disposed of. The labor organizations submitted their reply on the following day and then the entire correspondence was made public at the White House.

The question as to whether the controversy is to be submitted to the tribunal created by the railroad bill or to an independent tribunal was left open. Director General Hines conferred with Senator Cummins on February 15 regarding the labor provisions of the bill and submitted a draft of the proposed change to meet the present situation which was adopted by the conferees on the following day with some modifications. Whereas the conferees had provided for a series of boards of adjustment to settle wage controversies with different classes of employees, including subordinate officers, and a board of labor appeals, to be appointed by the President, to render a decision in case the bi-partisan adjustment board failed to agree, the bill as reported provides for an appeal board of nine members appointed by the President, consisting of three representatives of the railroads, three of the employees and three of the public. To guard against a possible agreement of the railroad and labor representatives at the expense of the public, a provision was added that a majority decision to be binding must be assented to by at least one of the public representatives. It was also decided to give the board original and final jurisdiction and to take from the adjustment boards the settlement of other than local disputes which might tend to cause a general interruption of interstate commerce, and to avoid the possibility of different treatment of different classes of employees by

different adjustment boards by placing jurisdiction over such general controversies as that now at issue in the hands of the higher board. The railroad labor organizations have always objected to a tribunal on which the representative of the public might be placed in a decisive position, and as soon as they heard of the change in the labor provisions made plans to endeavor to defeat it.

NEW YORK CENTRAL TRACK INSPECTION

THE RESULTS of the New York Central track inspection for 1919 show a general average condition of 82.5 per cent for the four divisions of the main line between New York and Buffalo with the Eastern division in first place with an average rating of 82.8 per cent. The highest rating for a supervisor's division in this territory, 83.3 per cent, was obtained by M. E. Egan of the Eastern division and F. L. Vault of the Mohawk division.

Thirty-three main line section premiums consisting of \$3 per month extra compensation were awarded to the section foremen having the best track on their respective sub-divisions, and, except on the electric division, the foreman having the best track on each division received an additional premium of \$2 per month, or a total of \$5 per month extra compensation. A tabulation showing the names of the foremen receiving the \$5 premiums is appended:

Name	Division	Rating
John Andros	Eastern	85.3
Henry Meyer	Mohawk	84.4
Frank Palmer	Syracuse	84
Tony Brail	Rochester	83
Fred Shirley	Ontario	84.5
Anthony Pietro	St. Lawrence	82.5
John Comiske	Adirondack	84.5
Walter D. Burger	River	84.5
Manuel Teats	Pennsylvania	82.8

Nine premiums of \$2 per month on branch line sections were awarded to the following foremen: John Harold, Ardsley, N. Y., Eastern division; Charles Duck, Niskayuna, N. Y., Mohawk division; Michael Giambattista, Salina, N. Y., and Frank Kopera, Buffalo, N. Y., Syracuse division; Dominic De Nardo, Ionia, N. Y., Rochester division; Thomas Mitchell, Ogdensburg, N. Y., St. Lawrence division; Leorenzo Klyne, Gardner, N. Y., River division, and James Brehaney, Westfield, Pa., and H. V. Brawley, Carrolltown, Pa., Pennsylvania division.

Ten premiums of \$3 per month for having the best yard sections were awarded to Vincenzo Barbieri, New York, Eastern division; Thomas Desorbo, West Albany, N. Y., and Joseph Rogers, Utica, N. Y., Mohawk division; Nicholas Buccio, Minoa, N. Y., and Melchior Gawron, Buffalo, N. Y., Syracuse division; Paul Comfort, Otis, N. Y., Rochester division; Arthur D. Butts, Rome, N. Y., Ontario division; John T. McCarthy, Ogdensburg, N. Y., St. Lawrence division; Joseph Cirilli, Weehawken, N. J., River division, and Melvin Delaney, Clearfield, Pa., Pennsylvania division.

ELECTRIFICATION IN CANADA.—Numerous reports have been circulated recently to the effect that the Canadian Pacific was contemplating the electrification of its lines. E. W. Beatty, president of the road, in speaking of the reports recently, said: "There is no foundation for the statement that the Canadian Pacific is considering the electrification of its system as a whole. The possibility of electrification of portions of the line, especially in the mountains, is always before us and it would seem to be both feasible and practicable when traffic conditions warrant it."

ACTIVITIES OF THE RAILROAD ADMINISTRATION

Congress Passes the Railway
Bill Late in February

More Data on Emergency
Rail Order Released



Washington, D. C.

THE ESCH-CUMMINS railroad bill as revised by the conference committee of the Senate and House, which had been working on it since December 22, was submitted to the two houses on February 18 and was passed by the House on February 21 and by the Senate on February 23 with large majorities. As we go to press the prompt signing of the bill by the President is anticipated.

The bill contains many important modifications from the text of the original bills as made by the conference in their efforts to reconcile the conflicting provisions. The labor provisions, after having been agreed upon, were entirely rewritten on February 16 in order to meet the emergency created by the general demand of the railroad labor organizations for increased wages, which President Wilson had promised them should be promptly passed upon by a tribunal which would function after the termination of federal control. These provided in effect for a plan of compulsory arbitration, but without penalties, relying on the weight of public opinion to enforce the decisions of a railway labor board to be appointed by the President and consisting of nine representatives, three representing the carriers, three representing the employees and subordinate officers and three representing the public, with a provision that at least one of the representatives of the public shall concur in the decisions.

The rate-making provisions of the bill also have been extensively revised in accordance with principles which have been publicly announced, although the exact text has been the subject of much work by the committee, and particularly by Chairmen Esch and Cummins of the House and Senate committees on interstate commerce. The rate-making rule, which is in Section 422 of the bill, provides that in the exercise of its power to prescribe just and reasonable rates the commission shall initiate, modify, establish or adjust such rates so that carriers as a whole, or as a whole in each of such rate groups or territories as the commission may from time to time designate, will, under honest, efficient and economical management and reasonable expenditures for maintenance of way, structures and equipment, earn an aggregate annual net railway operating income equal as nearly as may be to a fair return upon the aggregate value of the railway property of such carriers held for and used in the service of transportation. The commission shall from time to time determine and make public what percentage constitutes a fair return, the percentage to be uniform for all rate groups or territories which may be designated, and in making such determination it shall give consideration among other things to the transportation needs of the country and the necessity (under honest, efficient and economical management of existing transportation facilities) of enlarging such facilities in order to provide the people of the United States with

adequate transportation. During the two years beginning March 1, 1920, the percentage is fixed by the law and the commission shall take as such fair return a sum equal to $5\frac{1}{2}$ per cent of the aggregate value, but may in its discretion add thereto a sum not exceeding $\frac{1}{2}$ per cent to make provision in whole or in part for improvements, betterments or equipment which, according to the accounting system prescribed by the commission, are chargeable to capital account.

If, under these provisions, any carrier receives for any year a net railway operating income in excess of 6 per cent on its value as determined by the commission, one-half of such excess shall be placed in its reserve fund and the remaining one-half paid to the Interstate Commerce Commission for the purpose of establishing and maintaining a general railroad contingent fund. The value of the property and the net income shall be computed by railroad systems, irrespective of the returns of the various parts of such systems. After an individual reserve fund, which is to be used for lean years, reaches and is maintained at 5 per cent of the value of each property, the carrier's portion of the excess may be used by it for any lawful purpose.

The general railroad contingent fund is to be used by the commission in furtherance of the public interest in railway transportation either by making loans to carriers to meet expenditures for capital account or to refund maturing securities originally issued for capital account, or by purchasing transportation equipment and leasing the same to carriers.

Whereas the conferees had once agreed upon a plan for a series of boards of adjustment to settle wage disputes with various classes of employees, it was finally decided to leave to the carriers and the employees' organizations the organization of such boards, which therefore will not be government bodies. The railway labor board will be authorized to pass upon cases which they fail to agree on or which they do not consider, or upon the board's own motion if it is of the opinion that the dispute is likely to interrupt commerce substantially. It will have its office at Chicago. Prior to September 1, 1920, each carrier, according to the bill, shall pay to each employee or subordinate officer wages or salary at a rate not less than that fixed by the decision of any agency or railway board of adjustment under the Railroad Administration in effect on March 1.

The bill provides that federal control shall cease at midnight of February 29, the date set by the President, but that nothing in the act shall be construed to affect his power under the act of 1916 to take over railroads for war purposes. Power is given to the President to settle up the affairs of federal control and an additional appropriation of \$200,000,000 is given him for the purpose. In addition a revolving fund of \$300,000,000 is created from which the Interstate Commerce Commis-

sion may make loans to the railroads within 26 months, to be repaid in five years. The present guaranteed standard return is to be continued for six months to roads which before March 15 accept the provisions of the act relating thereto, which include an agreement of the carrier to turn over to the government any income in excess of the guaranty for the period, but in determining the government's obligation there shall not be included in operating expenses for maintenance more than a sum fixed by the commission which shall be based on the provisions of the standard contract which refer back to the pre-war test period after equating for increased prices and wages. The commission is also directed to require the elimination or restatement of the other operating expenses and revenues for the guaranty period to the extent necessary to correct and exclude any disproportionate or unreasonable charge to revenues and expenses for the period.

The bill also includes many important amendments to the act to regulate commerce, greatly increasing the powers and duties of the Interstate Commerce Commission, which is to be increased from 9 to 11 members and their salaries increased from \$10,000 to \$12,000.

RAILROAD ADMINISTRATION CREATES DIVISION OF LIQUIDATION CLAIMS

Director General Hines announced on February 5 that T. C. Powell having resigned as director of the Division of Capital Expenditures of the Railroad Administration, effective on February 15, because of his election as vice-president of the Erie, the Division of Capital Expenditures would be discontinued on that date. Mr. Powell was also chairman of the claims committee of the Railroad Administration. In view of the necessity for making continuous provision for the settlement of questions arising out of federal control, the Division of Liquidation Claims was created, effective on February 15, with Max Thelen, now director of the Division of Public Service, as director, in addition to his other duties. The new division will have jurisdiction over capital expenditures and claims relating thereto, and also claims relating to maintenance, and will include the necessary technical force. E. E. Adams, engineering assistant to the director of the Division of Capital Expenditures, has returned to his former position as consulting engineer for the Union Pacific System at New York. E. M. Durham, Jr., chief engineer of construction of the Southern Railway, with headquarters at Washington, D. C., has been appointed chief of the department of maintenance of way and structures in the Division of Liquidation Claims and will take over the organization of the maintenance of way department in the Division of Operation now under the direction of A. M. Burt, assistant director of the Division of Operation, effective on the return of the roads to private control.

The law, accounting and finance divisions of the Railroad Administration will have plenty of work to do long after the relinquishment by the government of the operation of the railroads, but the other divisions will begin on that date to disband. None of them will be able to quit at once and it is probable that various sections will wind up their work at different times.

RAILROADS IN 1919 EARNED ONLY HALF OF STANDARD RETURN SET BY CUMMINS BILL

The net operating income of the Class I railroads in 1919 was about \$515,000,000, which represents a return of only 2¾ per cent on their estimated investment of \$19,000,000,000, according to a preliminary compilation of the monthly returns to the Interstate Commerce Commission. This is just half of the 5½ per cent prescribed as the standard in the Cummins-Esch bill as agreed upon by the conference committee and represents about 57

per cent of the standard return guaranteed to the railroads during federal control. The Railroad Administration statements increase the amount somewhat by charging back into 1918 the retroactive wage payments which extend back into that year, although paid in 1919.

The preliminary figures show that while total operating revenues passed the five-billion-dollar mark for the first time, amounting to \$5,184,000,000, the operating expenses and taxes increased by an even greater amount, totaling \$4,678,000,000 for the year. The deficit for the year as compared with the standard return on this basis is about \$390,000,000, although Mr. Hines' preliminary statement, after recasting the accounts, placed it at \$349,000,000. The Railroad Administration's complete statement for December and the year has not yet been issued.

The railroads having operating revenues above \$25,000,000 (which report about 80 per cent of the total operating revenues of the Class I roads), according to the monthly report of the Interstate Commerce Commission, earned in 1919 a net operating income of \$429,551,778, as compared with \$546,687,677 in 1918. Their total operating revenues were \$4,127,463,039, as compared with \$3,910,928,814 in 1918, and their total operating expenses were \$3,498,244,648, as compared with \$3,188,919,166. Two of these roads, the Chicago & Eastern Illinois and the Pittsburgh, Cincinnati, Chicago & St. Louis, had operating deficits for the year, while 16 had deficits for December. For December the \$25,000,000 roads had a net operating income of \$14,089,435, as compared with \$21,647,841 in 1918.

For the Class I roads and 17 switching and terminal companies maintenance of way and structures expenses in 1919 were \$778,105,318, as compared with \$656,600,508 in 1918.

HOW THE EMERGENCY RAIL ORDER HAS BEEN DISTRIBUTED

As announced briefly in last month's issue, the Railroad Administration induced the War Department to issue orders commandeering 73,500 tons of open hearth steel rail to be delivered by March 1, under the powers conferred by Section 120 of the national defense act passed in 1916.

The division of the commandeering orders as reported in the February issue has since been revised slightly. The final figures are as follows:

Illinois Steel Company	11,350 tons
Carnegie Steel Company.....	13,500 tons
Tennessee Coal, Iron & Railroad Company.....	12,200 tons
Bethlehem Steel Company	10,450 tons
Midvale Steel & Ordnance Company.....	26,000 tons

Several newspaper stories created the impression that this peremptory order was made because of a controversy over the price of rail, but Director General Hines declared that this was not the case and issued a public statement as follows:

"An erroneous impression has been created by publications regarding the action of the Railroad Administration in arranging to secure steel rail to meet its urgent needs. The Railroad Administration urgently needs approximately 120,000 tons of steel rail which it ascertained should be rolled in about three weeks. It is essential that this rail be secured as promptly as possible.

"The Railroad Administration has been seeking since October to secure sufficient rail, but has found it impossible to do so largely because of conditions arising out of the recent steel strike.

"In view of the urgency of the situation commandeering orders for a part of the needed rail have been issued on the request of the Railroad Administration. The price to be paid to some mills for rail delivered under these

orders has been agreed upon at \$47 a ton, and as to others a reasonable price will be fixed in accordance with the provisions of the statute."

The distribution of the 73,500 tons between railroads is as follows:

	Gross Tons
Bangor & Aroostook	250
Chicago, Indianapolis & Louisville.....	500
Cleveland, Cincinnati, Chicago & St. Louis.....	2,000
Detroit, Toledo & Ironton	1,000
Erie	2,000
Grand Trunk Western.....	500
Hocking Valley	500
Lake Erie & Western.....	1,000
Michigan Central	1,000
New York, Chicago & St. Louis.....	1,500
New York, New Haven & Hartford.....	4,000
Toledo & Ohio Central.....	500
Toledo, St. Louis & Western.....	1,000
Wabash	2,000
Total Eastern region.....	17,750
Baltimore & Ohio	6,000
Bessemer & Lake Erie.....	500
Central of New Jersey.....	1,000
Grand Rapids & Indiana.....	500
Pennsylvania Eastern Lines	20,000
Philadelphia & Reading.....	1,500
Western Maryland	500
Total Allegheny region	30,000
Chesapeake & Ohio	1,000
Norfolk & Western	4,000
Virginian	1,000
Total Pocahontas region	6,000
Atlanta, Birmingham & Atlantic	500
Carolina, Clinchfield & Ohio.....	700
Charleston & Western Carolina.....	500
Cincinnati, New Orleans & Texas Pacific.....	500
Gulf, Mobile & Northern.....	500
Louisville & Nashville	2,000
Louisville, Henderson & St. Louis.....	500
Mobile & Ohio	1,000
Nashville, Chattanooga & St. Louis.....	1,000
Norfolk Southern	500
Richmond, Fredericksburg & Potomac.....	700
Total Southern region	8,400
Gulf Coast Lines	1,000
Kansas City Southern	1,000
Missouri Pacific	2,000
Total Southwestern region	4,000
Chicago & Alton	1,000
Chicago, Rock Island & Pacific.....	5,000
Kansas City Terminal	1,000
Total Central Western region.....	7,000
Chicago Heights Terminal	100
Minneapolis & St. Louis.....	250
Total Northwestern region	350

CO-OPERATIVE CONGRESS—The All-American Farmer-Laborer Co-operative Congress organized by the four big railway brotherhoods and the affiliated shop crafts as a plan to escape the profits of the middleman by a system of co-operative buying, production and distribution of the necessities of life was held at Chicago from February 12 to 15, inclusive. The steps already taken towards co-operative dealing between groups were explained at the various sessions of the Congress, and in particular the action taken by the United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers in purchasing clothing factories and the action taken by several groups of farmers in handling the sale and distribution of their products. Among those who addressed the sessions of the Congress were: Warren G. Stone, grand chief of the Brotherhood of Locomotive Engineers; Allen E. Barker, grand president of the United Brotherhood of Maintenance of Way Employees and Railway Shop Laborers, and O. C. Trask, assistant president of the same organization.

MATERIAL MARKET

QUOTATIONS on track materials have either experienced a distinct advance during the past month or have been definitely withdrawn, as is the case with steel tie plates in the Chicago market, where, although the quotation remains nominally at 2.75 cents per lb., no orders are being accepted. Wrought iron tie plates, on the other hand, have been marked up appreciably, as will be noted in the accompanying table. The price of rails is still subject to variation. The United States Steel Corporation is quoting \$45 and \$47 per ton for Bessemer and open hearth steel, respectively, although a number of mills are asking \$10 more and at least one has sold a small tonnage of open hearth rails at as much as \$62 per ton. The prices on the rails recently commandeered by the government, as announced briefly in last month's issue, will be \$47 for some mills and for others will be "determined by statute." There has been very little activity in the rail market since this compulsory order was placed.

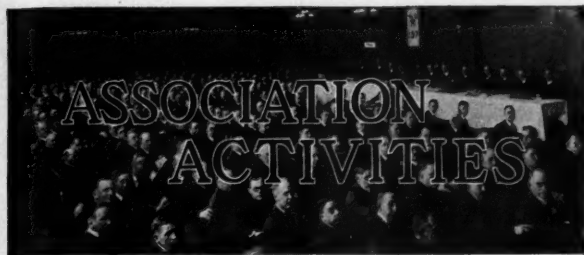
An examination of the table below will show that there have been advances in prices nearly all along the line. In fact, about the only prices that show no change are those which have become purely nominal because the market is closed. The structural steel shops at Chicago were recently in difficulties owing to a strike. At present they are unable to work to full capacity because they cannot get enough plain material. This shortage seems to be countrywide, although several of the railroads have been able to arrange for their 1920 requirements of bridge material.

	Prices in Cents Per Pound			
	January 15		February 15	
	Pittsburgh	Chicago	Pittsburgh	Chicago
Track spikes.....	3.35 to 3.50	3.62	3.60	3.62 to 3.87
Track bolts.....	4.35	4.62	5.17	5.17 to 5.27
Boat spikes.....	3.85 to 4.00	4.12 to 4.27	4.25	4.52
Angle bars.....	2.75	2.75	2.75	2.75
Tie plates, steel	2.75	2.75	2.75	2.75
Tie plates, iron	3.25	3.25	3.00 to 4.00	3.75
Plain wire.....	3.50	3.50	3.00 to 3.50	3.50
Wire nails.....	3.24 to 4.50	3.52 to 3.77	3.25 to 4.50	3.50
Barbed wire, galvanized ..	4.10 to 4.45	4.37 to 4.72	4.10 to 4.45	4.40
C. I. pipe, 6-in. or larger (per ton).....	66.80	66.80	69.80	69.80
Plates	2.65 to 3.00	2.92 to 3.17	2.65 to 2.90	2.92 to 3.17
Shapes	2.65 to 2.75	2.62 to 3.52	2.45 to 2.70	2.72 to 3.77
Bars (steel).....	2.35 to 3.00	3.02	2.35 to 3.00	2.62 to 3.52
Rivets	4.10	4.37	4.50	4.42

A comparison of the scrap table below with that given last month shows an advance of from \$1 to \$2 during the past four weeks. This comparison, however, does not give any real measure of the marked advance of scrap prices during the past year. The present prices on most classes of scrap are within one dollar of double those prevailing the first of March, 1919.

	Chicago		St. Louis	
	Per Gross Ton		Per Net Ton	
Relaying rails	\$40.00 to \$50.00	\$45.00 to \$50.00		
Rerolling rails.....	35.00 to 36.00	33.50 to 34.00		
Rails less than 3 ft. long.....	30.50 to 31.00	30.50 to 31.00		
Frogs and switches, cut apart..	25.00 to 26.00	27.00 to 27.50		
No. 1 railroad wrought.....	26.50 to 27.50	26.50 to 27.00		
Steel angle bars.....	25.50 to 26.00	24.50 to 25.00		

Lumber has advanced two or three dollars per thousand feet in a great many grades during the past month "as usual." This condition seems to permeate all classes of lumber, applying to Douglas fir and yellow pine, as well as the hard woods. With the return of the roads to private control the tie market takes on new activities, with the promise that the prices for ties will be higher.



AMERICAN RAILWAY ENGINEERING ASSOCIATION

Plans for the twenty-first annual convention, which will be held at the Congress Hotel, Chicago, on March 16-18, inclusive, are developing rapidly. Two bulletins containing the reports of eight committees have already been mailed to the members, while four additional bulletins containing the remaining reports will go into the mail during the next 10 days.

The program for the meeting, indicating the order of presentation of the committee reports, is as follows:

Tuesday, March 16

President's Address.
Reports of Secretary and Treasurer.
Reports of Standing and Special Committees on
Water Service.
Masonry.
Buildings.
Uniform General Contract Forms.
Track.
Electricity.
Conservation of Natural Resources.
Economics of Railway Location.

Wednesday, March 17

Wood Preservation.
Ballast.
Iron and Steel Structures.
Stresses in Railroad Track.
Ties.
Roadway.
Rules and Organization.
Economics of Railway Labor.

Annual Dinner at 6:30 P. M.

Thursday, March 18

Signals and Interlocking.
Yards and Terminals.
Rail.
Records and Accounts.
Signs, Fences and Crossings.
Wooden Bridges and Trestles.
Economics of Railway Operation.
Standardization.
New Business.
Election and Installation of Officers.
Adjournment.

No session will be held on Tuesday evening, but the members will be encouraged to attend the exhibit of the National Railway Appliances Association at the Coliseum, this being the only evening that this exhibit will be open.

Following the inauguration of the campaign for new members by the Board of Direction at a recent meeting, applications are now being received in considerable numbers, approximately 60 such applications having come in during the last two weeks.

AMERICAN WOOD PRESERVERS' ASSOCIATION

The paper on "Fungi That Attack Cross Ties," by C. J. Humphrey, which is referred to in the report of the convention, and which will appear in its final form in the proceedings with a number of plates showing the appearance of typical fungi in their natural colors, attracted so much favorable comment that the executive committee has authorized the printing of this report as a separate bulletin for sale to railway and com-

mercial tie companies for distribution to their inspectors in the timber.

A meeting of the executive committee will be held at the Auditorium Hotel, Chicago, at 10 a. m., Monday, March 15. The principal business to come before the committee at this meeting will be the appointment of committees for the ensuing year.

THE BRIDGE AND BUILDING ASSOCIATION

A meeting of the Executive committee will be held in Chicago during the convention of the American Railway Engineering Association to consider the report of the Arrangements committee for the next convention relative to hotels and suggesting a change in the date of the meeting in order to secure adequate facilities. This association is scheduled to hold its next convention at Atlanta, Ga., in October.

THE ROADMASTERS' ASSOCIATION

A meeting of the Executive committee is to be held in Chicago during the week of March 15 to consider plans for the next convention, which is scheduled to be held at St. Louis, Mo., in September, and to discuss the suggestion that a permanent secretary be employed to devote his entire time to the work of the organization.

RENTAL CHARGES ON CONSTRUCTION EQUIPMENT

THE PRICES charged in the past as rentals on construction equipment have been so varied as to make it difficult to prepare a preliminary estimate on construction work. In view of that fact the committee on methods of the Associated General Contractors of America has collected a large amount of data in an attempt to prepare a standard list of rental charges. To date four schedules have been published in the News-Letter issued by that association, which are as follows: Classes A, B and C, representing tools which will last through 50, 75 and 100 weeks, respectively, of continuous work:

Equipment	Equivalent Daily Rental List C	Daily Rental List A	Daily Rental List B
Boiler only, 30 hp. and smaller...	\$ 2.00	\$ 2.50	\$ 1.50
Boiler only, 30 to 80 hp.....	2.67	4.00	2.50
Bucket, tippie and bottom dump....	.42	.40	.30
Bucket, clamshell, 1 yard*.....	2.50	3.50	1.50
Cars, skip, 1½ yard.....	.33	.50	.25
Cars, steel, 1 yard and smaller....	.25	.25	.15
Crusher only	3.67	4.00	2.50
Cutter, bar portable, with motor..	1.58	4.00	2.75
Derrick, 30 to 59 ft., wooden**....	.50	2.50	1.50
Drill, small air .....	.50	.75	.50
Drill, steam .....	.75	1.50	1.25
Elevator, platform or bucket.....	.33	.50	.50
Engine, skeleton, 2-drum	1.33	3.00	2.50
Engine, gasoline, to 8 hp.....	.50	1.00	.65
Engine, gasoline, 10 hp.....	.83	2.00	1.00
Level, engineers' .....	.25	.50	.30
Mixers, with gas engine, 11 to 15 ft. cap.	2.50	4.00	3.00
Motors, 2 hp. ....	.25	.30	.20
Motors, 5 hp. ....	.42	.75	.40
Motors, 10 hp. ....	.58	1.00	.70
Motors, 25 hp. ....	.83	2.00	1.50
Motors, 50 hp.	1.50	4.00	3.00
Pumps, centrifugal, 10-in.....	1.17	5.00	2.50
Pumps, pulsometer, to 4 inch.....	1.00	1.00	.60
Pumps, with gas engine.....	.58	2.50	1.00
Pumps, diaphragm, with gas engine	.58	1.50	1.00
Saw benches, plain .....	.50	.50	.50
Saw benches, plain, with motor or gas engine attached .....	.92	1.00	1.00
Saw swing cut off, no power.....	.17	.50	.50
Steam shovels, revolving traction..	24.00	30.00	15.00
Transit .....	.33	1.00	.50

*¾ cu. yd. on List C.

**Home made on List C.

GENERAL NEWS DEPARTMENT

Congressman Albert H. Vestal of Indiana, chairman of the House committee on coinage, weights and measures, is constructing a bill for the adoption of the metric system of weights and measures in the United States. Extended hearings will be held on the bill when referred and those interested in the question will be invited to appear before the committee.

The Federal Barge Line has awarded a contract to the Dubuque Iron Works, Dubuque, Ia., for the construction of a covered, steel, floating terminal. The terminal, which will be used on the Mississippi River for the transfer of freight from railroad cars to barges, will cost approximately \$300,000, the appropriation being made by the United States Railroad Administration.

The Railroad Commission of California has recently issued a report recommending the construction in Los Angeles of a new union passenger station and a new freight station, the elimination of grade crossings, and other improvements, the total cost of which has been estimated to be about \$32,233,445. It further recommended a joint railroad between Los Angeles and Pasadena to be used by the Atchison, Topeka & Santa Fe and the Los Angeles & Salt Lake.

The final hearings before the referees in the case between the receiver for the Chicago & Eastern Illinois and the Railroad Administration concerning the amount of compensation which the railroad shall receive because of its operation under government control, was held in Washington, D. C., on February 20. The receiver and the Railroad Administration were approximately \$7,000,000 apart on the amount. The contest was instituted at the instance of Federal Judge George A. Carpenter, sitting at Chicago.

The second annual railroad conference of the American Association of Engineers will be held at the Congress Hotel, Chicago, on March 15. W. W. K. Sparrow, corporate chief engineer of the Chicago, Milwaukee & St. Paul, will act as chairman of the morning session. Among the topics which will be discussed are: The association's work in the railroad field during 1919, plans for future railroad work, the organization and function of railroad sections and the association's railroad salary schedule.

The State Railroad Commission of Colorado in a recent report to Governor Shoup advocated the public financing of three long tunnels to reduce present open-pass summit elevations of railways crossing the mountains. The proposed tunnels are (1) near James Peak, on the Denver & Salt Lake, 6.4 mi. long, at an elevation of 9,100 ft.; (2) on the Denver & Rio Grande, near Marshall Pass, 6 mi. long, at an elevation of 9,500 ft.; (3) on the same road near Cumbres Pass. The present maximum grades of three to four per cent can be reduced to two per cent by this means.

Director General Hines made a statement on the severity of the present winter, which was issued previous to the occurrence of the two very severe storms that visited in the eastern states during the middle of February. He calls attention to the fact that the winter weather was unusually severe in the eastern states throughout December and January and that temperatures were abnormally low in the middle west during December. In spite of these adverse conditions, the railroads loaded more traffic in January and December than in the same months of the two preceding years.

Representatives of five large organizations, whose memberships include approximately 4,000,000 farmers, met in Washington, D. C., on January 29, to prepare a petition addressed to President Wilson and Congress asking for the immediate return of the railroads to their owners and the enactment of legislation to meet present demands. Protest was made by the delegates against representations heretofore made that the farmers favor the continuance of government control for at least two years. W. J. Drummond, Kansas City, chairman of the board of governors of the International Farm

Congress, called the conference and T. C. Atkeson of the National Grange was elected chairman. Among the organizations represented were the National Farmers' Congress, the International Farm Congress, the National Grange, the American Federation of Farm Bureaus and the National Farm Union.

The Kansas Supreme Court holds that no public way is established across a switchyard merely because pedestrians for many years had so frequently trespassed thereon that they had worn a beaten track across it. Anyone who undertakes to cross a switchyard of many tracks, where engines and cars are likely to be moving at any time in the regular course of the railroad's business, is held a trespasser and does so at his own peril. The only duty of the railroad company and its employees towards such trespassers is not to willfully injure them.

The Ordinance passed by the City Council of Cleveland and subsequently confirmed by popular vote, permitting the construction of a union terminal station, to front on the Public Square, lapsed on January 1, 1920, through refusal of the Pennsylvania to join in the enterprise. The City Council considered amending the ordinance on December 29 so as to allow the railroads, with the exception of the Pennsylvania, to proceed alone. Although this plan failed to receive a majority, plans are now in progress to revive the project on a slightly modified basis.

An extensive plot to defraud the Railroad Administration of thousands of dollars through the circulation and sale of counterfeit passes was recently revealed with the arrest of a passenger on one of the trans-continental trains of the Atchison, Topeka & Santa Fe, as the train entered Chicago. Four others were arrested in connection with the plot at the same time, three at Los Angeles and one, a former brakeman and the originator of the plot, at Portland, Ore. The plan for the circulation and sale of counterfeit passes is said to have originated last November, since which time it is said that hundreds have been sold and used, most of them for trans-continental trips.

When a Missouri Pacific passenger train (No. 806) ran into an open draw over the Tensas River near Clayton, La., on February 4, the engine, baggage-car and combination mail and coach fell into the river, two coaches being left on the rails. A fireman, express messenger and an unknown number of negro passengers were drowned. The bodies of the express messenger and five colored passengers were recovered. The engineer is held responsible for the wreck, as it is reported that he overlooked all regularly fixed danger signals and the warning of the bridge-tender and the latter's helpers who were turning the draw. It is not known whether more negro passengers were drowned. A Missouri Pacific officer, who was injured in the accident, stated that the five whose bodies were recovered were the only passengers occupying the combination coach which fell into the river.

Eighteen tests were recently conducted by the road foremen of engines on the Baltimore & Ohio, Western Lines, for the purpose of determining how much coal is required to stop and start a slow freight train. The tests, which were run on an average of $7\frac{1}{2}$ miles each, one trip without a stop and one trip including a full stop, indicated that the excess coal consumed per stop was 328 lb. When no stop was made the average coal consumption was 1,204 lb., while an increase of approximately 21 per cent or 1,532 lb. was consumed when making a stop. J. B. Carothers, assistant to the federal manager, in a statement recently issued concerning the tests, states that unnecessary stops are caused principally by signal failures, failure of an operator to give a clear signal promptly, unnecessary slow orders, unnecessary flagging by the maintenance department, indifferent train dispatching and poor train inspection.

PERSONAL MENTION

ENGINEERS IN PENNSYLVANIA REORGANIZATION

Elsewhere in this issue is an account of the reorganization of the Pennsylvania system, listing changes in personnel in so far as they concern engineers and officers of other departments who received their training in the engineering and maintenance of way department. Below we present sketches of a number of those officers of the engineering and maintenance of way departments and officers of other departments who are essentially engineers, where the changes in personnel have resulted in promotions to higher positions.

The four newly elected regional vice-presidents are Elisha Lee, R. L. O'Donnel, J. G. Rodgers and Benjamin McKeen. **Elisha Lee** was born in Chicago on September 24, 1870. He is a graduate of Massachusetts Institute of Technology, class of 1892, and began railroad work as soon as he finished college as a rodman in the engineering department on the Tyrone division of the Pennsylvania. He was out of rail-

road service from 1895 to 1897. He returned to the Pennsylvania on the latter date and in April, 1899, was made an assistant supervisor. Two years later he was promoted to supervisor, and in August, 1902, was made assistant engineer of maintenance of way. In 1907 he was promoted to principal assistant engineer of the Philadelphia, Baltimore & Washington, and two years later was made superintendent of the New York, Philadelphia & Norfolk. March 3, 1911, he was made assistant to the general manager of the Pennsylvania Lines East and during federal control has been federal manager of the Pennsylvania Lines East.

J. G. Rodgers was born in 1863 and attended Lewiston Academy. He began railroad work in 1882 as rodman on the Pennsylvania and was then appointed an assistant engineer on construction. He was made assistant to the chief engineer and later assistant supervisor on the New York, Philadelphia & Norfolk. He was promoted to supervisor and then to superintendent of this road, and in March, 1909, was made assistant to the general manager of the Pennsylvania Lines East. In 1911 he was made general superintendent of the Northern division of the Pennsylvania, with office at Buffalo. During federal control he has been assistant to the president of the corporation, with office at Philadelphia.

Benjamin McKeen was born at Terre Haute, Ind., on January 23, 1864. He is a graduate of Rose Polytechnic Institute. He began railroad work as draftsman in the office of the superintendent of motive power of the Terre Haute & Indianapolis, now a part of the Vandalia, and in 1886 became a rodman on the engineering corps of the Pennsylvania. Later in the same year he was made resident engineer in



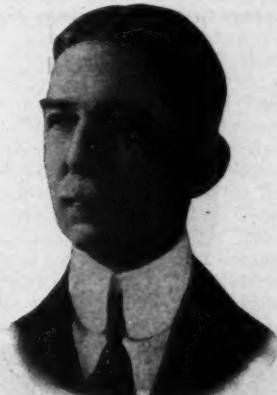
Elisha Lee



R. L. O'Donnel



J. G. Rodgers



Benjamin McKeen

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Richard Lincoln O'Donnel was born November 5, 1860, in Philadelphia. He attended the Polytechnic College at Philadelphia, graduating in 1882, and at once began railroad work as a rodman on the Cornwall & Lebanon, a part of the Pennsylvania. He worked as rodman, levelman and transitman and in 1884 went into the assistant engineer's office at Blairsville, Pa., as a draftsman. Two years later he was made assistant engineer in the principal assistant engineer's office at Altoona, Pa., and in the following March was made assistant supervisor on the Altoona division. In February, 1888, he was transferred to the Philadelphia division, and in August, 1889, to the Pittsburgh division. He worked as an assistant supervisor at New Florence, Pa., until November, 1889, when he was promoted to supervisor in the Altoona yard. In April, 1891, he was appointed assistant engineer of the Tyrone division and in 1894 was transferred to the Pittsburgh division. In 1897 he was appointed assistant superintendent of the Pittsburgh division and in 1902 was promoted to superintendent. In January, 1903, Mr. O'Donnel

charge of construction work on the Terre Haute & Logansport, now a part of the Vandalia, and in the following January was made engineer maintenance of way of the Logansport division. In 1889 he acted also as chief engineer of construction in the completion of the Indiana & Lake Michigan. In January, 1894, Mr. McKeen was made superintendent of the Peoria division of the Terre Haute & Indianapolis and in 1901 was made superintendent of the main line division of that road. In the following year he was made superintendent of the Chicago Terminal division of the Pennsylvania Lines West and in December, 1903, was appointed general manager of the Terre Haute & Indianapolis, now the Vandalia. In January, 1913, he was made general manager of the Pennsylvania Lines West. During federal control he was vice-president and engineer of the corporation for the Pennsylvania Lines West.

C. S. Krick, assistant general manager of the Pennsylvania Railroad, who has been promoted to general manager of the Eastern region, with headquarters at Philadelphia, Pa., was born at Reading, Pa., on March 16, 1886, and graduated from Lafayette College in 1887. Shortly after graduating he entered railway service as a rodman on the Pennsylvania, since which he has been consecutively rodman, assistant supervisor and supervisor, until January 1, 1903, when he was promoted to assistant engineer. In 1906 he was promoted to principal assistant engineer and in 1907 to division superintendent, remaining in that capacity until May, 1916, when he was promoted to general superintendent of the New Jersey division. In 1918 he was promoted to assistant general manager, which position he held until his recent appointment.

Thomas B. Hamilton, general superintendent of the St. Louis system of the Pennsylvania Lines West, who has been promoted to general manager of the Northwestern region, with headquarters at Chicago, was born at Columbus, Ohio, on August 7, 1865, and graduated from Princeton University in 1888. He entered railway service on November 18, 1888, as a rodman on the Jefferson, Madison & Indianapolis at Louisville, Ky., after which he was consecutively rodman, assistant on engineer corps and assistant engineer on several divisions. On May 1, 1897, he was promoted to division engineer maintenance of way of the Toledo division, serving in this capacity on several divisions until June 1, 1901, when he was promoted to superintendent of the Erie and Ashtabula division, being transferred in 1903 to the Cleveland and Pittsburgh division. On January 1, 1912, he was promoted to general superintendent of the Central system, with headquarters at Toledo, Ohio, and in January, 1914, was promoted to general manager of the Vandalia, with headquarters at St. Louis, being made general superintendent of the St. Louis system when the Vandalia was absorbed in the Southwest system.

W. C. Cushing, chief engineer maintenance of way of the Pennsylvania Lines West, who has been appointed engineer of standards and valuation of the system, with headquarters at Philadelphia, Pa., was born at St. John, New Brunswick, on March 18, 1863. After graduating from the University of New Brunswick and the Massachusetts Institute of Technology he entered railway service in 1887 with the Pennsyl-

same year with the Pennsylvania, Lines West, as an assistant in the engineering corps, being later promoted to assistant engineer on the Pittsburgh division. In June, 1901, he was promoted to division engineer maintenance of way, serving in this capacity on several different divisions until November, 1912, when he was promoted to superintendent of the Peoria division of the Vandalia. In July, 1913, he was appointed valuation engineer of the Lines West, remaining in that position until his recent appointment.

Fred J. Stimson, division superintendent on the Pennsylvania, Lines West, with headquarters at Richmond, Ind., who has been promoted to chief engineer maintenance of way of the Southwestern region, with headquarters at St. Louis, Mo., was born at Kalamazoo, Mich., on October 30, 1868, and entered railway service in November, 1888, with the Grand Rapids & Indiana as a clerk in the office of the claim and timber agent. The following year he worked as a rodman. He left this road in 1890 to go with the Colorado Midland as an assistant engineer, where he remained until December, 1892, when he returned to the Grand Rapids & Indiana as an assistant roadmaster. On January 1, 1904, he was promoted to division engineer and in July, 1915, he was promoted to division superintendent on the Pennsylvania, Lines West, which position he held until his recent appointment.

C. I. Leiper, division superintendent on the Pennsylvania Railroad, with headquarters at Jersey City, N. J., who has been promoted to general superintendent of the New Jersey division of the Eastern region, was born in Wallingford, Pa., on October 28, 1874. He graduated from Swarthmore College in 1895, after which he took a special course at the University of Pennsylvania and entered the service of the Pennsylvania Railroad in the construction department in 1897. In February, 1901, he was promoted to assistant supervisor on the Maryland division and in 1903 was again promoted to supervisor on the same division, later serving as supervisor on the Pittsburgh and the New York divisions. He was made principal assistant engineer of the Philadelphia, Baltimore & Washington on June 16, 1913, and in February, 1914, was promoted to superintendent of the New York, Philadelphia & Norfolk, with headquarters at Cape Charles, Va., being transferred in June, 1914, to superintendent of the New York division, which position he held until his recent appointment.

Robert V. Massey, general superintendent on the Pennsylvania Railroad, with headquarters at New York City, who has been promoted to assistant general manager of the Eastern region, with headquarters at Philadelphia, Pa., was born in Dover, Del., on September 29, 1871. He graduated from Sheffield Scientific School of Yale University in 1892 and entered railway service in the same year with the Pennsylvania in the construction department, transferring to the maintenance of way department in 1895. On November 1, 1895, he was promoted to assistant supervisor at Freeport, Pa., and subsequently served in the same capacity on the Northern Central at Baltimore, Md., and at Mifflin, Pa., on the Pennsylvania. On August 1, 1900, he was promoted to supervisor on the Schuylkill division and later served in a similar capacity on the Maryland division of the Philadelphia, Baltimore & Washington and in Pittsburgh yard. In April, 1907, he was promoted to division engineer of the Schuylkill division, being transferred to the New York division in 1909, where he remained until March, 1911, when he was promoted to superintendent of the New York, Philadelphia & Norfolk. In February, 1914, he was transferred to the Manhattan division of the Pennsylvania, with headquarters at New York City, acting subsequently in this capacity on this and other divisions until 1917, when he was promoted to general superintendent of the Eastern Pennsylvania division, being transferred later to the New Jersey division, where he remained until his recent promotion.

J. B. Hutchinson, Jr., division superintendent on the Pennsylvania Railroad, with headquarters at Pittsburgh, Pa., who has been promoted to general superintendent of the Northern Ohio division of the Northwestern region, with headquarters at Toledo, Ohio, was born at Bristol, Pa., on March 3, 1876, and educated at Princeton University. While attending college he worked for the Pennsylvania during summer



C. S. Krick

W. C. Cushing

vania as a rodman in the engineering corps. On January 27, 1889, he was promoted to engineer maintenance of way of the Cincinnati & Muskingum Valley, where he remained a year before becoming division engineer of the Indianapolis division in 1890. On June 1, 1894, he was transferred to the Pittsburgh division as division engineer, being promoted to superintendent of this division in 1901. He was later transferred to the Eastern division in 1902, and on January 1, 1903, was made chief engineer maintenance of way of the Southwest system, remaining in this position until he was appointed chief engineer maintenance of way of the Lines West in July, 1918.

Thomas J. Skillman, principal assistant engineer of the Eastern Pennsylvania division of the Pennsylvania Railroad, with headquarters at Altoona, Pa., has been promoted to chief engineer maintenance of way of the Northwestern region, with headquarters at Chicago. A sketch and photograph of Mr. Skillman appeared in the *Railway Maintenance Engineer* for December, 1919, page 461.

W. D. Wiggins, valuation engineer of the Pennsylvania, Lines West, who has been promoted to chief engineer maintenance of way of the Central region, with headquarters at Pittsburgh, Pa., was born at Richmond, Ind., on April 28, 1873, and graduated from Rose Polytechnic Institute at Terre Haute, Ind., in 1885. He entered railway service the

vacations and on January 1, 1898, was made a rodman, since which he was consecutively assistant supervisor and supervisor, until January, 1910, when he was promoted to division engineer of the West Jersey & Seashore, serving in this capacity on other divisions until April, 1917, when he was promoted to assistant superintendent of the Pittsburgh division. On October 25, 1917, he was promoted to superintendent of the Tyrone division of the same road, which position he held until his recent promotion.

Isaac W. Geer, general superintendent of the Southwest system of the Lines West, who has been appointed general manager of the Southwestern region, with headquarters at St. Louis, Mo., was born at Plainfield, Conn., on February 1, 1873. He graduated from Yale University in 1895 and entered railway service in the same year as a rodman on the Lines West. In July, 1898, he was promoted to assistant engineer on the Erie and Ashtabula divisions and in March, 1901, to engineer maintenance of way of the same division. In December, 1902, he was transferred to the Pittsburgh division, where he remained until January, 1904, when he was promoted to superintendent on the Terre Haute & Indianapolis, being transferred to Logansport, Ind., in November, 1906. In January, 1913, he was transferred to the Cleveland and Pittsburgh division of the Pennsylvania, remaining in that position until July, 1915, when he was promoted to general superintendent of the central system, with headquarters at Toledo, O., being transferred later to the Southwest system, with headquarters at Columbus, Ohio, where he remained until his recent appointment.

GENERAL

L. W. Baldwin, regional director of the Allegheny region, United States Railroad Administration, has been appointed vice-president of the Illinois Central. A sketch of Mr. Baldwin's railway career, much of which was spent in engineering and maintenance of way work, appeared in the *Railway Maintenance Engineer* for November, 1919, page 419.

E. H. Lee, corporate president of the Chicago & Western Indiana and the Belt Railroad of Chicago, with headquarters at Chicago, and formerly vice-president and chief engineer prior to government control, will become vice-president and general manager at the termination of federal control, with the same headquarters.

Lawrence A. Downs, assistant general manager of the Illinois Central, the Yazoo & Mississippi Valley and the Chicago, Memphis & Gulf, with headquarters at Chicago, has been appointed vice-president and general manager of the Central of Georgia, with headquarters at Savannah, Ga., effective March 1. Mr. Downs succeeds to the position held by L. W. Baldwin prior to government control, which has since been vacant. He was born at Greencastle, Ind., on May 9, 1872, and graduated from Purdue University in 1894. He entered railway service with the Vandalia in 1895 and from March, 1896, to 1898, was in an engineering party on the Illinois Central. From 1898 to March, 1907, he served as roadmaster on the Amboy, the Louisiana, the Springfield and the Chicago divisions of that road. Mr. Downs was appointed assistant chief engineer maintenance of way in March, 1907, and remained in that position until December 6, 1910, when he was promoted to superintendent of the Kentucky division. On November 1, 1915, he was promoted to general superintendent of all lines south of the Ohio river, with headquarters at New Orleans, La. He was

transferred to Chicago on August 1, 1917, to become general superintendent of the Northern lines, continuing in that position until January, 1919, when he was promoted to assistant general manager.

Robert S. Parsons, chief engineer of the Erie, has been appointed general manager of the Erie, under the new plan of organization whereby there are created four regions, each with a regional manager reporting to the general manager. Mr. Parsons was born at Hohokus, N. J., and studied at Rutgers College. He began railroad work in 1895 as rodman for the Erie and the following year was made assistant engineer. In 1899 he was appointed division engineer of the New York, Susquehanna & Western. He returned to the Erie in 1903 as engineer maintenance of way and three years later became assistant general superintendent of the same road. He was appointed superintendent of the Susquehanna division in 1907 and three years later was transferred to the New York



R. S. Parsons

division in the same capacity. On January 1, 1913, he was appointed assistant general manager of the lines east of Buffalo, N. Y., and Salamanca, with headquarters at New York. The following year he was appointed general manager of the Ohio Grand division, more recently known as the Erie Lines West, with office at Cleveland, Ohio, and in January, 1916, was appointed chief engineer. The following year he became assistant to the president and chief engineer and in November, 1917, became assistant to the president and general manager. Under the Railroad Administration he served as chief engineer, as noted above.

H. R. Safford, who, prior to government control, was chief engineer of the Grand Trunk, with headquarters at Montreal, Que., and who was engineering assistant to the director of the Central Western region, United States Railroad Administration, with headquarters at Chicago, has been appointed assistant to the president of the Chicago, Burlington & Quincy, the Colorado & Southern and allied lines. Mr. Safford was born at Madison, Ind., and graduated from Purdue University in 1895, entering railway service in the same year as a rodman with the Illinois Central. He was promoted to resident engineer in charge of construction in 1897 and to roadmaster in 1900. In May, 1903, he became principal assistant engineer and from 1905 to 1906 he was assistant chief

engineer, being promoted in the latter year to chief engineer maintenance of way and remaining in this position until May, 1910, when he resigned to become assistant to the president of the Edgar Allen American Manganese Steel Company. He resigned this position in October, 1911, to become chief engineer of the Grand Trunk, which position he held until appointed engineering assistant under the Railroad Administration as noted above.



Lawrence A. Downs



H. R. Safford

W. H. Finley, corporate president of the Chicago & North Western, with headquarters at Chicago, who was formerly chief engineer, has been elected president of the road under private control.

C. H. Stein, assistant to the general manager of the Central Railroad of New Jersey and the Philadelphia & Reading, with headquarters at Philadelphia, Pa., has been promoted to assistant to the president of the first named road. Mr. Stein was born at Baltimore, Md., on June 23, 1871. He entered railway service on December 7, 1889, with the Western Maryland as rodman and transitman. From February, 1891, until May, 1892, he served in the capacity of assistant engineer on construction, at the latter date being transferred to the maintenance of way department. He remained in this department until April, 1901, when he was promoted to assistant roadmaster. He became assistant supervisor in April, 1903, later being appointed supervisor of the Philadelphia & Reading, and in April, 1907, was promoted to engineer maintenance of way of the Central Railroad of New Jersey. On February 1, 1914, Mr. Stein became superintendent of the Central and Lehigh & Susquehanna divisions, which position he held until his promotion in August, 1918, to assistant to the general manager, a position he has retained until his present advancement.



C. H. Stein

ENGINEERING

R. W. Meek, signal supervisor on the Texas & New Orleans, with headquarters at Houston, Tex., has been appointed acting assistant superintendent in charge of maintenance on the Galveston, Harrisburg & San Antonio, with headquarters at San Antonio, Tex. Mr. Meek graduated as a mechanical engineer from the A. & M. College of Texas in 1904, and in September of the same year entered the service of the Mexican Petroleum Company, Elbano, Mexico, in the capacity of an assistant engineer, remaining in this position until March, 1905, when he resigned from this company and entered signal construction work on the Galveston, Harrisburg & San Antonio, in which service he has been promoted progressively through the trades of construction man, towerman, battery man and signal maintainer and shop foreman. In 1914 Mr. Meek was promoted to signal supervisor, remaining in this position until his recent appointment, as noted above.



R. W. Meek

Harold Knight, assistant superintendent of maintenance of the Erie system, with headquarters at New York, has been appointed regional engineer of the Ohio district, with office at Youngstown, Ohio. Mr. Knight was born at Stockport, N. Y., in 1881, and received his education in the schools of Middletown, N. Y., and Sheffield Scientific School, Yale University, graduating with the class of 1904. He entered

railway service in August, 1904, as chairman in the engineering department of the Erie at Elmira, N. Y., and in 1905 he was made assistant engineer at Hornell, N. Y. In 1908 he was promoted to division engineer of the Allegheny division, with headquarters at Salamanca, N. Y., and in 1912 was transferred to the New York division. In 1914 he was appointed signal engineer of the Erie system and on May 1, 1917, he was promoted to assistant superintendent of maintenance. In November, 1917, he was advanced to superintendent of maintenance, with office at New York. Later, during federal control, he served as assistant superintendent of maintenance, with office at the same place, which position he held at the time of his recent appointment, as mentioned above.

William N. Boyd has been appointed chief engineer of the Detroit, Bay City & Western and the Port Huron Southern, with headquarters at Bay City, Mich.

A. S. Kent, who was chief engineer of the Chicago, Indianapolis & Louisville prior to and during federal control, with headquarters at Chicago, has been appointed chief engineer, with the same headquarters.

H. O. Kelley, assistant engineer of the Wabash at St. Louis, Mo., has been appointed division engineer, with the same headquarters, succeeding **D. C. Bowman**, who resigned to become chief engineer of the Industrial Track Construction Company of St. Louis.

Lieutenant-Colonel B. Ripley, whose appointment as district engineer of the Ontario district of the Canadian Pacific, with headquarters at Toronto, Ont., appeared in the

February issue, was born at Oxford, Nova Scotia, on August 29, 1880. He entered railway service with the Great Falls & Canada in 1902 and was appointed assistant engineer for the Alberta Railway & Coal Company later in the year. From 1903 to 1905 he served as chief engineer of construction on the St. Marys-River Railway Company, leaving that road on the latter date to go with the Grand Trunk Pacific as resident and assistant engineer. In 1907 Mr. Ripley was appointed assistant engineer on the Canadian Pacific, later being promoted to engineer of grade separation. He

Lieutenant-Colonel B. Ripley

served overseas in command of the First Canadian Railway Construction Battalion from 1916 to 1919.

V. K. Hendricks, assistant chief engineer of the St. Louis-San Francisco, with headquarters at St. Louis, Mo., has resigned, effective March 1.

Anton Anderson, who was principal assistant engineer of the Chicago, Indianapolis & St. Louis prior to federal control and corporate engineer during the government control period, with headquarters at Chicago, has been promoted to engineer maintenance of way, with headquarters at LaFayette, Ind.

Galen B. Owen, superintendent of maintenance of the Erie, with headquarters at New York City, has been promoted to chief engineer on the general manager's staff, with the same headquarters. Mr. Owen was born on July 31, 1860, and began railway work on the Lehigh Valley in 1880, serving as a rodman until August, 1881, when he was promoted to assistant engineer. In April, 1889, he was promoted to roadmaster and engineer of construction, resigning in August, 1896, to go with the Baltimore & Ohio as division engineer maintenance of way. In April, 1899, he was promoted to superintendent of maintenance of way on the same road, with headquarters at Baltimore, Md., and from July, 1902, to April 15



of the following year he was engineer maintenance of way of the West Virginia Central & Pittsburgh, now a part of the Western Maryland. On the latter date he was appointed assistant to the general manager of the Erie, and in May, 1907, was promoted to engineer maintenance of way of the same road. In 1913 he was granted a leave of absence and subsequently left railway service. In April, 1917, he returned to the service of the Erie as superintendent of maintenance, which position he held until his recent appointment.

W. W. Morrison, engineer maintenance of way of the Pittsburgh & Shawmut, with headquarters at Kittanning, Pa., has been promoted to chief engineer, with the same headquarters.

A. W. Newton, corporate chief engineer of the Chicago, Burlington & Quincy, with headquarters at Chicago, will return to the position of chief engineer which he held prior to government control.

J. L. Holst, engineer of structures of the New York Central, with headquarters at New York, has resigned, after 25 years' service, to assume control of a large engineering project for a private concern.

F. R. Ramsey, chief engineer of Toledo, St. Louis & Western under federal control, with headquarters at Frankfort, Ind., has been appointed chief engineer, the position he held prior to federal control, with the same headquarters.

H. F. Passel, engineer maintenance of way of the Cincinnati, Indianapolis & Western, with headquarters at Indianapolis, Ind., has been appointed chief engineer, the position he held prior to government control, with the same headquarters.

A. A. Mathews, who prior to federal control was engineer maintenance of way Missouri, Kansas & Texas, with headquarters at Parsons, Kan., and during federal control was chief engineer of the St. Louis Southwestern and the St. Louis Southwestern of Texas, has been appointed chief engineer of the same roads with the same headquarters.

C. D. Purdon, who prior to federal control was chief engineer of the St. Louis Southwestern and the Shreveport Bridge & Terminal and during federal control was consulting engineer of the St. Louis Southwestern lines, with headquarters at St. Louis, Mo., has been appointed consulting and valuation engineer of the St. Louis Southwestern and St. Louis Southwestern of Texas with the same headquarters.

Aubrey G. Haven, Brooklyn, N. Y., has been appointed real estate engineer in charge of valuation of land and right-of-way for the Gulf, Mobile & Northern. Mr. Haven, who was with the Interstate Commerce Commission on land valuations for more than five years, was previously engaged on real estate appraisals for the New York Central, the Lehigh Valley, the Canadian Pacific, the Atlantic Coast Line and the Baltimore & Ohio.

E. G. Lane, chief engineer of the Baltimore & Ohio, Western Lines, with headquarters at Cincinnati, Ohio, has been appointed engineer maintenance of way of the same road, Western Lines, and of the Dayton & Union and the Dayton-Union, with the same headquarters. **H. A. Lane**, chief engineer, Eastern Lines, with headquarters at Baltimore, Md., has had his jurisdiction extended over the Western Lines, the Union Railroad, the Staten Island Rapid Transit and the Baltimore & New York.

J. C. Patterson, principal assistant engineer of the Erie, with headquarters at New York City, has been promoted to regional engineer, New York district, with the same headquarters. Mr. Patterson was born at Carmichaels, Pa., in 1882 and graduated from Pennsylvania State College in 1905. He entered railway service with the Pennsylvania Railroad in the same year, where he served until August, 1906, when he entered the employ of the New York Central. He remained with that road until April, 1907, when he went with the Cleveland, Cincinnati, Chicago & St. Louis. From October, 1907, to April, 1909, he was employed by John C. O'Bryan, consulting engineer, returning to railway service with the Northern Pacific on the latter date, where he remained until October, 1909, when he entered the employ of the Chicago Great Western. In July, 1913, he became chief draftsman on the Erie and in May, 1916, was promoted to assistant valua-

tion engineer. He was made office engineer in February, 1917, remaining in that position until July, 1918, when he was promoted to principal assistant engineer, which position he held until receiving his recent appointment.

H. C. Booz, corporate engineer of the Pennsylvania Railroad, with headquarters at Philadelphia, Pa., has resigned, to become chief engineer of the Berwind-White Coal Mining Company.

C. F. Loweth, chief engineer of the Chicago, Milwaukee & St. Paul at Chicago, who was federal chief engineer during the government control period, has been reappointed chief engineer under private control.

L. J. Putnam, chief engineer of the Chicago & North Western during the government control period, and previous to that principal assistant engineer, with headquarters at Chicago, has been appointed chief engineer of the North Western under private control.

C. P. Richardson, assistant engineer on special duties in the office of the chief engineer, Chicago, Rock Island & Pacific, with headquarters at Chicago, has been promoted to division



C. P. Richardson

engineer of the Chicago Terminal division, with the same headquarters, succeeding **M. J. Brew**, deceased, as noted elsewhere. Mr. Richardson was born on December 27, 1882, at Concord, N. H. Following his graduation from Dartmouth College in 1907, he obtained his first experience in railway work with the Missouri Pacific, as an assistant on the engineering corps, later holding the positions of assistant division engineer and investigator on special work in the office of the chief engineer at St. Louis. In August, 1912, he left the Missouri Pacific to enter the service of the Chicago, Rock

Island & Pacific as assistant engineer on track elevation at Chicago, a position which he held for over six years. In the summer of 1918 he left the Rock Island temporarily to take a position with the United States Housing Corporation at Davenport, Iowa, but returned to the Rock Island in December as engineer of water service, with headquarters at Chicago. He held this position until late in 1919, when he was transferred to the chief engineer's office as assistant engineer on special assignment.

TRACK

P. H. McFadden, roadmaster on the Northern Pacific, with headquarters at Livingston, Mont., has been promoted to general roadmaster of the Montana division, with the same headquarters.

Hans Yseth has been appointed roadmaster on the Sioux City division of the Great Northern, with jurisdiction from Willmar, S. D., to Ihlen, and with headquarters at Marshall, Minn., in place of **J. S. Breit**, who has been transferred to the district from Garretson, S. D., to Sioux City, Ia., on the same division, with headquarters at Sioux City, succeeding **J. A. Rask**, resigned.

O. C. Wilkes, whose appointment as roadmaster on the Union Pacific, with headquarters at Grand Island, Nebr., was noted in last month's issue of the *Railway Maintenance Engineer*, was born at Bucklin, Mo., on October 13, 1871. He entered railway service with the Union Pacific on September 4, 1901, as a laborer and was promoted to section foreman in March, 1902. From 1903 to 1906 Mr. Wilkes served as extra gang foreman, being promoted to roadmaster at the latter date. He resigned in April, 1917, and was again appointed roadmaster as noted above on December 16, 1919.

C. Halverson has been promoted to roadmaster on the Superior-Mesaba division of the Great Northern, with headquarters at Kelley Lake, Minn., succeeding Ulysses Kenworthy, resigned. John Torkelson has been promoted to roadmaster on the Havre division, with headquarters at Cut Bank, Mont., in place of D. F. Mulkern, resigned. H. D. Brown has been promoted to roadmaster on the Marcus division, with headquarters at Oroville, Wash., succeeding Harry Coulton, who has been transferred to the Spokane division, with headquarters at Bonners Ferry, Wash., in place of Iver Johnson, assigned to other duties.

John E. Campbell, extra gang and section foreman on the Great Northern, has been promoted to roadmaster, with headquarters at Blaine, Wash. Mr. Campbell was born at Galesburg, Ill., on October 4, 1888, and entered railway service in April, 1910, with the Great Northern as a clerk. From October, 1912, to June, 1913, he served as extra gang foreman. He left the Great Northern on the latter date to go with the Pacific Great Eastern as construction foreman, which position he held until November, 1915, when he returned to the Great Northern as section foreman. From June, 1917, to March, 1918, Mr. Campbell served as roadmaster, being appointed extra gang and section foreman in March, 1918, which position he held until his appointment as noted above.

C. E. Johnson, acting roadmaster on the Duluth, South Shore & Atlantic, with headquarters at Marquette, Mich., has been promoted to roadmaster, with the same headquarters. Mr. Johnson was born at Negaunee, Mich., on January 26, 1890, and entered railway service on October 25, 1907, with the Duluth, South Shore & Atlantic as a section laborer. He was promoted to section foreman on April 1, 1909, and on May 1, 1910, was promoted to foreman in the Negaunee yard. He served as foreman until May 1, 1918, with the exception of the summers of 1915, 1916 and 1917, when he held the position of extra gang foreman. On May 1, 1918, Mr. Johnson entered military service and served overseas with Co. "C," 144 M. G. Battalion. He was discharged on April 29, 1919, and resumed his duties as foreman in the Negaunee yard in May. On June 1, 1919, he was appointed acting roadmaster, which position he held until his recent promotion.

OBITUARY

Richard I. Wilby, former engineer maintenance of way of the Toledo, Peoria & Western, died in Deerfield, Mass., on January 11.

M. J. Brew, division engineer on the Chicago, Rock Island & Pacific, with headquarters at Chicago, died on February 3 at his home in that city.

A. L. Hertzberg, engineer of bridges and roadway on the Canadian Pacific, with headquarters at Toronto, Ont., died at Toronto on January 31. He was retired from active service on a pension a few weeks ago.

J. H. Cummin, heating inspector on the Long Island Railroad, with headquarters at Jamaica, N. Y., died suddenly on January 29, at the age of 71 years. Mr. Cummin had been active in bridge and building circles for many years, having been president of the American Railway Bridge & Building Association in 1898-9.

Max Lindemann, civil engineer, who retired from active service in the maintenance of way department of the Chicago, Milwaukee & St. Paul in 1905, died in his home at Epworth, Iowa, on January 20, at the age of 77 years. Mr. Lindemann was employed by the Chicago, Milwaukee & St. Paul in the Dakotas and Minnesota in 1870 and in 1881 by the Canadian Pacific in the construction of its lines from Winnipeg west.

Correction.—The article entitled "Treating Water with Boiler Compounds," which was published on page 62 of the February issue of the *Railway Maintenance Engineer*, was incorrectly credited as having been presented before the Western Railway Club, Chicago. This was an original article prepared by Mr. Mahlie for the Simmons-Boardman publications.

CONSTRUCTION NEWS

The Canadian Light Railway Construction Company, Ltd., is planning to build a metre gage railway from Elk Lake on the Temiskaming & Northern Ontario to Gowganda, Ont. Extensions will also be run from Gowganda into the Fort Matachewan and west to the Shining Tree districts in Ontario.

The Canadian National Railways have completed the construction of a double track extension 4.92 miles long from Halifax Ocean Terminal Station, N. S., to Bellevue Junction; three miles of second track from Athul, N. S., to Little Forks, and one mile in New Brunswick. Other work under way consists of double track and line diversion from Moncton, N. B., to mile 3.5 on the Newcastle subdivision; double track from Springhill Junction, N. S., to Matcan; double track and line diversion from St. Rosalie Junction, Quebec to Bagot; a continuation of construction of the Halifax Ocean Terminal; a yard extension at Dartmouth, and in installation of standard gage and third rail on the Prince Edward's Island Railway.

The Carolina & Georgia is expected to complete track-laying from Andrews, N. C., to Hayesville, a distance of 25 mi., about March 1.

The Chicago, Burlington & Quincy is reconstructing its elevators at Murray yard, Kansas City, Mo., which were recently destroyed by fire, at a cost of approximately \$500,000.

The Delaware, Lackawanna & Western and the New York Central will be connected by a loop line with the harbor docks of Syracuse, N. Y.

The Flemingsburg & Northern has been incorporated, with a capital of \$150,000, to construct a 7½-mi. line in Fleming county, Ky., which may extend through the mountain counties, to develop coal and oil lands. The incorporators are Atilla Cox, Louisville, Ky.; A. P. Darnell, T. S. Andrews and R. L. Dudley of Flemingsburg.

The Lehigh Portland Cement Company, Allentown, Pa., contemplates building 12 mi. of railroad from Gadsden, Ala., to limestone quarries near the Colvin mountains.

The Miami & Tampa has graded 15 mi. alongside of the Miami canal and expects to have 25 mi. ready for operation by next fall. William C. Wolfe of Miami is president and N. W. Parlee is engineer.

The Michigan Northern has had a line surveyed by Esselstyn, Murphy & Hanford, engineers, Detroit, Mich. It is the intention of the promoters to begin the construction of the road this spring.

The Moorefield Southern, a new company, is to build a narrow-gage line, 20 mi. long, from Moorefield up the valley of the south branch of the Potomac river to Peru, W. Va. W. B. Cornwell, Winchester, Va., is president and William T. Morgan is chief engineer, with headquarters at Wardensville, W. Va.

The Morgantown & Wheeling, which is planning to extend its line into Fairmont, W. Va., is reported concentrating its efforts toward the ultimate extension to Waynesburg, Pa., with the idea of securing a route through to Pittsburgh.

The New York & New Jersey Port Commission has proposed a \$20,000,000 connecting railroad for freight interchange between the roads on both sides of the Hudson river at New York City. The road, which will link trunk lines terminating on the New Jersey shore and those on the New York side of the Hudson at Piermont, N. Y., will extend from Piermont, near Nyack, N. Y., to Elizabeth, N. J., on Newark bay. It will be 45 mi. long and double tracked.

The Oil Fields Short Line will be extended from Clifford, Okla., to Braman, a distance of approximately 10 miles. W. Matthews is vice-president and chief engineer at Miami, Okla.

The Oklahoma Southwestern, a company now in the process of incorporation, will build a new line between Okmulgee, Okla., and Bristow, about 35 mi. long, connecting at

Okmulgee with the St. Louis-San Francisco and the Okmulgee Northern. T. B. Slick is president of the new road and W. Matthews is vice-president and chief engineer, with temporary offices at Miami, Okla.

The Pacific Great Eastern is considering the relocation of 15 mi. of its line near the Cottonwood river, British Columbia, which will shorten the route by about five miles and eliminate considerable curvature. The estimated cost of the relocation is approximately \$500,000.

Plans for the construction of a railway from Boothbay Harbor to South Newcastle, Me., connecting with the Maine Central, have been proposed by L. Maddocks and the citizens of Boothbay Harbor. A bridge from both sides of the harbor to the proposed station is also considered, the estimated cost being about \$200,000.

The Tampa Southern has completed its line from Orient, Fla., on the Atlantic Coast Line, near Tampa, to Bradentown, a distance of about 40 mi. D. C. Gillette of Tampa is president.

The Southern Railway Company, with headquarters at San Antonio, Tex., proposes to extend the Artesian Belt Railroad. This company, which has a capital stock of \$250,000, has been recently incorporated for this purpose.

The Virginian Railway will soon start construction on a line 14½ mi. long from a point on the main line near Mabens, W. Va., up Milan creek, to develop coal lands. A. M. Traugott, Norfolk, Va., is acting chief engineer.

IRON AND STEEL

The Atchison, Topeka & Santa Fe has bought about 10,000 kegs of spikes, the Norfolk & Western 8,000, and the Chicago, Burlington & Quincy 5,000 kegs, in the Pittsburgh market.

The Baltimore & Ohio has placed orders for an aggregate of 40,000 tons of rail with the United States Steel Corporation and its subsidiaries.

The Boston & Maine has bought 10,500 tons of rails from the Lackawanna Steel Corporation and a similar amount from the Bethlehem Steel Corporation.

Canadian railroads have recently placed orders for a total of 230,000 tons of rail with the Algoma Steel Corporation.

The Corps of Engineers, United States Army, is offering for sale by informal bids a quantity of special size rail and track materials, including 1,333 gross tons of 67.53-lb. Russian rail at Norfolk, Va., and Kearney, N. J.; 1,091 gross tons of 35-lb. A.S.C.E. rail at Norfolk, Va., Kearney, N. J., Port Newark, N. J., and Philadelphia; 1,101 gross tons of 30-lb. A.S.C.E. rail at Kearney, N. J.; 2,946 gross tons of 25-lb. A.S.C.E. rail at Norfolk, Va., Kearney, N. J., Port Newark, N. J., New Cumberland, Pa., and Philadelphia; splice bars for 80-lb. A.R.A. type "B" rail; splice bars for 67.53-lb. Russian rail; splice bars for 50-lb. A.S.C.E. rail; track bolts and nuts for use with 80-lb. A.R.A. type "B" rail; track bolts and nuts for 67.53-lb. Russian rail; track spikes for 40-lb. A.S.C.E. rail; tie plates for 80-lb. A.R.A. type "B" rail; rail braces for 80-lb. A.R.A. type "B" rail; railroad crossings made of 80-lb. A.R.A. type "B" rail; railroad crossings made of 67.53-lb. Russian rail, and re-railers.

The Pennsylvania Lines have ordered 40,000 tons of rails from the Illinois Steel Company.

The Philadelphia & Reading has placed orders for 1,500 tons of rails with an eastern mill and is inquiring for 5,000 to 10,000 tons additional.

The Richmond, Fredericksburg & Potomac is inquiring for 7,000 to 9,000 tons of 100-lb. rail.

Sophus Berendsen, New York City, is in the market for 10,000 to 12,000 tons of fabricated bridge steel.

The United Fruit Company has ordered 455 tons of 40-lb. rails and 70 tons of 60-lb. rails with fastenings from the United States Steel Products Company and has also divided an order for 56 switches and frogs of 30-in. gage to go with the above order between the United States Steel Products Company and the Weir Frog Company.

The Wabash has placed an order for 10,000 tons of rails with the Lackawanna Steel Company.

SUPPLY TRADE NEWS

GENERAL

The Dayton Mechanical Tie Company, Dayton, Ohio, has taken over the sales of the Coover railroad track brace.

The Q. & C. Company, New York City, has purchased the Everett snow-melting device, formerly manufactured by E. A. Everett, New York City.

The United States Cast Iron Pipe & Foundry Company has opened an office in the Stollard Building, Dallas, Tex., in charge of C. W. Hanlon, southwestern sales agent.

The American Chain Company, Inc., New York City, has purchased the capital stock of the Highland Iron & Steel Company, Terre Haute, Ind., and will continue the latter concern's business.

The Ball Lumber Company, Eugene, Ore., successor to the Valley Tie & Lumber Company, has recently completed plans to expand its service and business. R. J. Mentz, for many years identified with the Munsey and Pacific Coast lumber products in the Portland, Ore., and Seattle, Wash., districts, has been appointed manager and sales manager.

The Blaw-Knox Company, Pittsburgh, Pa., has purchased the C. D. Pruden Company, Baltimore, Md., manufacturers of standardized steel buildings. J. G. Campbell, purchasing agent of the Blaw-Knox Company, has resigned to become assistant treasurer of the C. D. Pruden Company, and William S. Boyd, formerly assistant purchasing agent of the Crucible Steel Company and purchasing agent of the Page Steel & Wire Company, has been appointed purchasing agent of the Blaw-Knox Company, succeeding Mr. Campbell.

The Williams-Hayward Company has been incorporated at Chicago for the manufacture of varnishes, enamels and paint specialties. LeRoy A. Williams, for 21 years associated with the railroad department of the Flood & Conklin Company, Newark, N. J., is president of the new company, and Oscar C. Hayward, for 18 years manager of railroad sales of the Tousey Varnish Company, Chicago, is vice-president. Otto Woldt has been appointed head of the manufacturing department and Max Huhnholz superintendent of the enamel and paint specialties department.

The Imperial Belting Company, Chicago, has opened a railroad sales department under the direction of A. G. Pickett as general manager. Mr. Pickett, who was formerly connected with the railroad and power specialties department of the H. W. Johns-Manville Company, New York City, will have the following sales engineers under his direction: Edward H. Willard, David L. Jennings and William D. Otter, all formerly with the H. W. Johns-Manville Company; William G. Willcoxen, formerly associated with the Boss Nut Company, Chicago, and Edward A. Woodworth, formerly secretary of the Committee on Standards for Locomotives and Cars of the United States Railroad Administration. A new office has been opened in the Merchants' National Bank Building, St. Paul, Minn., in charge of Blake C. Hooper.

Fairbanks, Morse & Co., Chicago, has decided to change from a closed to an open corporation and has changed its capitalization from 25,000 shares of common stock of \$100 par value, representing assets of \$20,000,000, to 325,000 shares of no par value. After the present stockholders have received ten shares of new stock for each old share now held, 50,000 of the remaining 75,000 new common shares will be issued at once. An initial offering to employees of 12,500 shares has been over-subscribed and 37,500 shares have been purchased by a Chicago brokerage concern, which will offer that amount publicly. The final 25,000 shares of new stock will be reserved for subscription by employees and for future financing. This company was founded in 1858 and this is the first time in its history that outside capital has been taken into the business and employees been given an opportunity to purchase stock of the company. Net sales during the four-year period ended December 31, 1919, exceeded \$93,-

500,000 and net sales for 1919 were about \$28,500,000. The net assets behind the new common stock will be \$23,687,500, or \$78.95 a share, after the completion of the present financing, exclusive of good will and other intangible items.

J. C. Jameson, formerly of the Indianapolis Switch & Frog Company, has been appointed vice-president and sales manager of the Dayton Mechanical Tie Company, effective February 1.

PERSONAL

D. B. Wright, who has been a special representative with the Lehon Company, Chicago, for the past nine years, has severed his connection with that company, effective March 1.

J. B. Johnston, formerly manager of the ordnance department of the Crucible Steel Company of America at Harrison, N. J., has been appointed general manager of the Standard Scale & Supply Company, Pittsburgh, Pa.

J. A. McLennan, general superintendent of the Link-Belt Company, Philadelphia, has resigned to become general manager of the McDonough Manufacturing Company, Eau Claire, Wis.

B. G. Koether, sales manager for the Hyatt Roller Bearing Company, New York City, with headquarters at Detroit, Mich., has been promoted to vice-president, with headquarters at Harrison, N. J.

William R. Gummere, representative in Cleveland, Ohio, for the Independent Pneumatic Tool Company, Chicago, for a number of years, has again become affiliated with that company. He will be connected with the Pittsburgh branch.

C. B. Ferry, vice-president of the Chicago, Milwaukee & St. Paul, has been elected a director of the Associated Welding Companies, Inc., New York City, a corporation formed recently by 13 electric welding companies.

H. B. Kirkland, recently discharged from service as a captain in the construction division of the United States army, assigned to the Chicago Ordnance Storage Depot, has resumed his duties as president of the Concrete Mixing and Placing Company, Chicago.

A. R. Horn, inspector of devices with the Q. & C. Company for over 10 years, with headquarters in Chicago, died in Minneapolis on December 28, 1919, at the age of 70. Mr. Horn was a division superintendent on the old Wisconsin Central before his connection with the Q. & C. Company.

Harold L. Tillson has been promoted to the management of the Portland Cement Association's activities in Iowa, with headquarters at Des Moines. Mr. Tillson has been connected with the association for more than three years and since December, 1917, has been identified with its Iowa work.

H. G. Stephens has resigned as eastern manager of the Republic Creosoting Company, with office in Philadelphia, Pa., to accept a position with the Alignum Company. **N. Rockwell**, with headquarters at Detroit, has been promoted to succeed Mr. Stephens and **E. G. Day** has been transferred from Buffalo, N. Y., to take charge of the Detroit office in place of Mr. Rockwell.

Harry Z. Bixler, chief engineer of the Brier Hill Steel Company, Youngstown, Ohio, and **T. M. Phillips**, superintendent of the washed metals department of the same company, have resigned to enter the steel business as members of a new company now in the process of organization. **W. H. Ramage**, assistant chief engineer, has been promoted to succeed Mr. Bixler and **E. J. Kauffman**, chief chemist, has been promoted to succeed Mr. Phillips.

C. E. Laverenz has been appointed special railroad representative on the staff of the manager of western railroad sales of the Chicago Pneumatic Tool Company, with headquarters at Chicago. Mr. Laverenz was an inspector in the Ordnance Department of the United States Navy for several years and previously held positions as a boilermaker and a foreman of the Chicago & North Western and the Illinois Central. **Edward A. Woodworth** has also been appointed a special representative on the staff of the manager of western sales, with headquarters in Chicago.

A. N. Lucas, superintendent of the locomotive shops of the Chicago, Milwaukee & St. Paul, with headquarters at Mil-

waukee, Wis., has been appointed district manager of the Oxweld Railroad Service Company, with headquarters at Chicago. Mr. Lucas entered railway service as a boiler-maker apprentice with the Chicago & North Western in 1881. In January, 1883, he entered the service of the Milwaukee Northern at Green Bay, Wis., now a part of the Chicago, Milwaukee & St. Paul system, where he served in various capacities until January, 1901, when he was transferred to Dubuque, Iowa. In April, 1904, he was transferred to the Milwaukee shops, where he was promoted to general foreman of boiler work for the entire system. Mr. Lucas was promoted to assistant superintendent of motive power in May, 1917, and a year later was placed in charge of the locomotive department of the Milwaukee shops as shop superintendent.

Alexander MacDonald Graver, vice-president of the Graver Corporation, East Chicago, Ind., died at his home in Chicago on January 31. Mr. Graver, one of five brothers who controlled the Graver Corporation, formerly the Graver Tank Works, was born at Pittsburgh, Pa., on May 15, 1883. He received his education at the University of Michigan, graduating in 1905. He then entered the engineering department of the William Graver Tank Works, where he had charge of the electrical and steam equipment and later of the remodeling of the company's manufacturing plant. Mr. Graver entered the purchasing department in 1908 and shortly after assumed charge of the purchase of steel plates. From 1910 to the time of his death Mr. Graver was identified with the sales department of the organization and for the past two years has been virtually sales manager, although holding the title of vice-president of the organization.



Alexander MacDonald Graver

TRADE PUBLICATIONS

W. S. M. Car Dumpers.—Bulletin No. 49, 16 pages, illustrated, has recently been issued by the Wellman, Seaver, Morgan Company, Cleveland, Ohio, describing and illustrating its various types of car dumpers.

Chains.—A 20-page illustrated booklet has been issued recently by the Columbus McKinnon Chain Company, Columbus, Ohio, which contains information regarding the various types and sizes of chains manufactured by this company. It also includes tables on weights, sizes and strength, etc., of chains.

Blawforms.—The Blaw-Knox Company, Pittsburgh, Pa., has issued a small illustrated folder showing, through the medium of photographs and descriptive matter, the various types of concrete construction work on which Blawforms have been used, and conveying a general idea of their application to such classes of work.

Track.—The Railroad Supply Company, Chicago, has recently issued the second edition of "Track," an illustrated pocket handbook of 220 pages for trackmen, which is devoted particularly to tie plates, their use, manufacture and methods of application, together with other track devices. It also contains tables and other miscellaneous data pertaining to track construction and maintenance.

W. C. K. City.—Westinghouse, Church, Kerr & Co., New York City, have recently issued an eight-page folder which contains a large composite illustration of the different structures designed and constructed in their entirety by this company. The balance of the folder is devoted to a description of these and other classes of construction work that have been done by this company on a cost plus basis.

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